

**INTERNATIONAL CRITICAL TABLES
OF
NUMERICAL DATA
PHYSICS, CHEMISTRY AND TECHNOLOGY**

INTERNATIONAL CRITICAL TABLES OF NUMERICAL DATA, PHYSICS, CHEMISTRY AND TECHNOLOGY

Prepared under the Auspices of the International
Research Council and the National
Academy of Sciences

BY THE
NATIONAL RESEARCH COUNCIL
OF THE
UNITED STATES OF AMERICA

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PREFACE BY THE BOARD OF TRUSTEES

The publication of International Critical Tables at a price that would make possible a world-wide distribution required that the undertaking be financed by those appreciating its importance and in a position to make the necessary investment. Some 244 firms and individuals and two of the larger Foundations have provided the sum of \$170,000 required for the compilation.

Many individuals have given freely of their time and effort in helping to obtain the funds necessary for the compilation of this work. In addition to those who have been responsible for assigned territory, there are a large number of others in industrial organizations which have supported the enterprise, and grateful acknowledgment is made of their interest and help, quite as much as if it were possible to give here the complete list of names. Indeed, it is impossible for the trustees to know of all those who at different stages of the work have rendered valuable assistance.

Special acknowledgment is due to the Carnegie Corporation of New York and to the International Education Board, whose appropriations in the support of these were a large factor in making its successful completion possible.

It is appropriate to give here special recognition to those who assumed and carried out definite responsibility in the solicitation of funds, as well as to those whose financial support enabled the project to be made a reality.

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The work of the trustees began with the appointment of Hugh K. Moore in 1920, with whom were later associated Julius Stieglitz, representing the American Chemical Society, and E. P. Hyde, representing the American Physical Society. After a substantial sum had been procured, the number was enlarged to include H. E. Howe and later George P. Adamson and Charles L. Reese. Mr. Hyde resigned to go abroad and was succeeded by Frank B. Jewett, who has lately been succeeded by Michael Pupin as representative of the American Physical Society. Upon relinquishing his active duties in the National Research Council, H. E. Howe was succeeded as Secretary of the Board of Trustees by W. M. Corse, but remained a member of the Board; and a little later Edward B. Craft was added to the Board.

The trustees have been obliged to place a maximum limit on the cost of this work, but they realize that other material which could not be included because of financial limitations should be made available and that International Critical Tables, if it is to render maximum service, should become an established institution, with supplements and revisions published from time to time, in order that these fundamental data may be made available as rapidly as the values are established through further research. An endowment therefore should be sought for International Critical Tables, and with the appearance of the completed set it is believed the enterprise will appeal to many of those able to make such an endowment a reality.

The trustees wish to express their gratitude to the many industrialists who have given of their time to become acquainted with this enterprise, for the courtesy which they have everywhere met, and for the widespread cooperation without which International Critical Tables could not have been brought into existence.

George P. Adamson	Hugh K. Moore
William M. Corse	Michael I. Pupin
Edward B. Craft	Charles L. Reese
Harrison E. Howe	Julius Stieglitz

PREFACE BY THE BOARD OF EDITORS

At the organization meeting of the International Union of Pure and Applied Chemistry, held in London in June 1919, the Union approved as one of its projects the compilation of International Critical Tables of Numerical Data of Physics, Chemistry, and Technology, and assigned to the United States of America the financial and editorial responsibility for the undertaking. The project was later given the patronage of the International Research Council at its Brussels meeting in 1923.

On behalf of the National Academy of Sciences, the National Research Council of the United States accepted the executive, editorial and financial responsibilities of the project, and with the cooperation of the American Chemical Society and the American Physical Society, created a Board of Trustees to take charge of the financial and business administration, and a Board of Editors to supervise and carry out the preparation of the text.

The first action of the Board of Editors, early in 1922, was to approve the appointment of Corresponding Editors in different parts of the world, particularly in all those countries in which conditions were such that they might be expected to take a really active part in the undertaking. In making these appointments, the Board first sought the advice of competent individuals in the several countries, and in accordance with the suggestions thus received, appointed ten Corresponding Editors and empowered them to arrange for Advisory Committees to assist in the work. In the case of certain countries, the Board was unsuccessful in its efforts to secure cooperation, usually either because of the receipt of no reply or an unfavorable reply, or through failure of the Corresponding Editor, after appointment, to perform his duties.

The general plan of preparation of the Tables was as follows: The subject matter was first divided into some 300 different sections. The Corresponding Editors were then asked to recommend for the several sections one or more persons who should either have some special knowledge of the subject matter of the section, or be otherwise qualified to pass critical judgment upon the available information on the subject. On the basis of the recommendations thus received, the Board of Editors selected the Cooperating Experts, to whom was intrusted the task of critically compiling, and displaying in suitable form, the available quantitative information upon the several topics. In making these selections, the Board consistently endeavored to secure the best man available in the light of all the information which it possessed. In certain special fields composed of closely related topics, the Board provided also for the appointment of Special Editors to supervise the work and to assist in the final arrangement of the material.

In the course of its labors the Board of Editors has enjoyed the cooperation of numerous organizations and individuals whose advice, suggestions, and assistance, in many ways have greatly aided it in its complex and difficult task. It is especially indebted to the several Corresponding Editors and their Advisory Committees, who have generously contributed their time and thought to the success of the work; to the Special Editors; to the U. S. Bureau of Standards, the National Physical Laboratory of Great Britain and the Physical Society of France; to the International Commission in charge of Annual Tables; and to various organizations and individuals who made available unpublished data for the use of the Cooperating Experts.

PREFACE PAR LE COMITÉ DES RÉDACTEURS

Lors de l'Assemblée d'organisation de l'Union internationale de Chimie pure et appliquée, qui eut lieu à Londres en Juin 1919, l'Union approuva comme l'un de ses projets l'élaboration de Tables critiques de valeurs numériques de physique, chimie et technologie, et elle chargea les Etats-Unis d'Amérique de la responsabilité financière et d'édition de l'entreprise. Le projet fut, plus tard, placé sous le patronage du Conseil international de Recherches, à son assemblée de Bruxelles en 1923.

Chargé de ces attributions, le Conseil national de Recherches des Etats-Unis, agissant en collaboration avec la Société chimique américaine et la Société physique américaine, nomma un Conseil d'Administration et un Comité des Rédacteurs.

La première activité que manifesta le Comité des Rédacteurs, au début de 1922, fut d'approuver la nomination de Rédacteurs-correspondants dans les différentes parties du monde, particulièrement dans tous les pays dont les conditions autorisaient l'espoir d'une collaboration active dans cette entreprise. Pour procéder à ces nominations, le Comité sollicita d'abord l'avis de personnalités compétentes dans les divers pays, et c'est en tenant compte des suggestions ainsi obtenues qu'il nomma dix Rédacteurs-correspondants et leur donna les pouvoirs nécessaires pour organiser des Comités-consultatifs dans le but d'aider à l'accomplissement du travail. Dans le cas de certains pays, les efforts du Comité en vue de s'assurer leur coopération furent vains, soit qu'il n'y eût pas de réponse ou que celle-ci fut défavorable, soit encore que le Rédacteur-correspondant, après sa nomination, eût manqué à ses engagements.

Le plan général de préparation de ces Tables fut le suivant: l'ensemble des matières à traiter fut d'abord divisé en quelque 300 différentes sections. Les Rédacteurs-correspondants furent alors priés de recommander, pour les différentes sections, une ou plusieurs personnes qui eussent des connaissances spéciales du sujet traité dans la section ou qui fussent qualifiées pour formuler un jugement critique sur les informations à disposition concernant le sujet. Sur la base des recommandations ainsi reçues, le Comité des Rédacteurs choisit les Experts-coopérants qui furent chargés de la compilation critique et de la disposition sous une forme convenable des informations quantitatives disponibles sur les différents sujets. En faisant cette sélection, le Comité s'efforça de s'assurer la collaboration de la personne qui, d'après les renseignements recueillis, était la plus qualifiée et qui se trouvait alors disponible. Dans certains domaines spéciaux, composés de sujets étroitement apparentés, le Comité se chargea aussi de nommer des rédacteurs spéciaux pour diriger le travail et pour aider à l'arrangement final de la matière.

Au cours de ses travaux, le Comité des Rédacteurs a eu le plaisir d'enregistrer la coopération de nombreuses organisations et de particuliers dont les conseils, les suggestions et l'aide lui ont été, en maintes circonstances, d'un grand secours dans l'accomplissement de sa tâche complexe et difficile. Il est spécialement reconnaissant aux nombreux Rédacteurs-correspondants et à leurs Comités-consultatifs qui ont généreusement donné leur temps et leur pensée pour assurer le succès de l'oeuvre; aux Rédacteurs spéciaux, au U. S. Bureau of Standards, au National Physical Laboratory of Great Britain et à la Société de Physique de France; à la Commission internationale chargée des Tables annuelles; ainsi qu'aux

VORWORT DER REDAKTIONS-KOMMISSION

An der geschäftlichen Sitzung der Internationalen Union für reine und angewandte Chemie in London, Juni 1919 billigte die Union, als eine ihrer Aufgaben, die Abfassung Internationaler kritischer Tafeln, numerischer Daten der Physik, Chemie und Technologie und betraute die Vereinigten Staaten von Amerika sowohl mit dem finanziellen als auch mit dem redaktionellen Teil dieser Aufgabe. Der Plan erhielt später die Förderung durch International Research Council an der Tagung in Brüssel 1923.

Entsprechend dieser Betrauung errichtete National Research Council der Vereinigten Staaten, zusammenwirkend mit American Chemical Society und American Physical Society vorgehend, eine geschäfts-führende Kommission und eine Redaktions-Kommission.

Die ersten Schritte, welche die Redaktions-Kommission zu Beginn des Jahres 1922 machte, war, sich korrespondierende Mitglieder in allen Teilen der Welt zu sichern, besonders in denjenigen in welchen die Bedingungen vorhanden waren, die eine lebhaftige Beteiligung an dem Unternehmen erwarten Hessen. Nach diesem nahm die Kommission zuerst den Rat massgebender Persönlichkeiten verschiedener Länder entgegen; in Übereinstimmung mit den so erhaltenen Vorschlägen, wurden zehn korrespondierende Mitglieder bestimmt, welche nun einen beratenden Ausschluss zu bilden hatten, um der Arbeit ihre Unterstützung zu zuwenden. In einigen Ländern gelang es der Kommission nicht Mitarbeiter zu erlangen, meistens deshalb weil keine, oder eine ablehnende Gegenäusserung erfolgte, oder, dass das korrespondierende Mitglied, nach der entsprechenden Zusage nicht vorging.

Die Grundlinien für die Bearbeitung der Tafeln waren die folgenden. Das Material wurde zuerst in etwa dreihundert verschiedene Abschnitte zerlegt. Die korrespondierenden Mitglieder wurden dann gebeten, für einige dieser Abschnitte, einen oder mehrere Mitarbeiter zu empfehlen, die entweder besondere Kenntnisse über den Gegenstand des Abschnittes besitzen, oder imstande waren, kritisch, vorhandenes Material durchzugehen. Auf Grund der so erhaltenen Empfehlungen, wählte die Redaktionskommission die Mitarbeiter aus, die mit der Aufgabe betraut wurden, kritisch die numerischen Daten des betreffenden Gegenstandes durcharbeiten und in entsprechender Form darzustellen. Bei dieser Auswahl war die Kommission ganz besonders bestrebt, nach den vorhandenen Mitteilungen, den besten zur Verfügung stehenden Mitarbeiter zu erhalten. In gewissen nahe verwandten Gebieten war man darauf bedacht, besondere Redaktions-mitglieder zu erhalten, um die Arbeit hier zu überwachen und tätigen Anteil der Schlussredaktion des Materials zu nehmen.

Im Laufe ihrer Bestrebungen konnte sich die Redaktions-Kommission der Mitarbeit zahlreicher Vereinigungen und einzelner Personen erfreuen, deren Ratschläge, Winke und Beihilfe ihnen bei der verwickelten und schweren Aufgabe von grossem Nutzen waren. Die Redaktionskommission ist besonders Dank ihren verschiedenen korrespondierenden Mitgliedern und dem beratenden Ausschuss schuldig, die in grossmütiger Weise ihre Zeit und Arbeit dem Erfolg dieser Tafeln gewidmet haben, ferner auch den Mitgliedern, die die Arbeit an den besonderen Kapiteln überwachten. Der Dank gebührt U. S. Bureau of Standards, National Physical Laboratory of Great Britain und Société de Physique de France, der Internationalen Kommission betraut mit der Herausgabe der Tables annuelles und den verschiedenen Ver-

PREFAZIONE DELL' UFFICIO DI REDAZIONE

Nella conferenza tenuta a Londra nel giugno 1919 per organizzare la Unione Internazionale della Chimica Pura ed Applicata venne, tra gli altri, formulato il progetto di compilare delle Tabelle Critiche Internazionali contenenti dati numerici di fisica, chimica e tecnologia, e venne affidata agli Stati Uniti la responsabilità finanziaria ed editoriale dell'impresa. Al progetto fu in seguito accordato il patronato del Consiglio Internazionale di Ricerche nella riunione del 1923 a Bruxelles.

In seguito all'incarico ricevuto, il Consiglio Nazionale di Ricerche degli Stati Uniti, d'accordo con la American Chemical Society e con la American Physical Society, nominò un Consiglio di Amministrazione ed un Ufficio Editoriale.

Come suo primo atto, l'Ufficio, nel 1922, nominò Redattori Corrispondenti in tutto il mondo, scegliendoli di preferenza nei Paesi dove poteva ritenersi che essi avrebbero preso parte attiva al lavoro. Le nomine furono fatte dopo aver sentito il parere di persone competenti. A questo modo furono scelti dieci Redattori Corrispondenti e ad essi venne data facoltà di nominare ciascuno un Comitato consultivo col compito di assisterli nel lavoro. In alcuni Paesi l'Ufficio non riuscì ad assicurarsi collaborazione di sorta, o perchè addirittura non gli fu possibile ottenere una risposta, o perchè la risposta fu negativa, o perchè il Redattore Corrispondente scelto, dopo essere stato nominato, mancò agli obblighi assunti.

Il piano generale di preparazione delle tabelle è stato il seguente. Si è divisa la materia in circa 300 capitoli differenti, e i Redattori Corrispondenti sono stati invitati a suggerire per ogni singolo capitolo il nome di una o più persone le quali o avessero una speciale competenza nell'argomento o potessero ritenersi capaci di vagliare criticamente tutto quello che si conosce al riguardo. In base alle proposte ricevute, l'Ufficio di Redazione scelse gli Esperti, e a questi affidò l'incarico di raccogliere, vagliare ed esporre in forma opportuna i dati quantitativi che si sono potuti riunire sui diversi argomenti.

Nel fare la scelta degli Esperti l'Ufficio cercò sempre di assicurarsi la collaborazione degli uomini che, in base alle informazioni avute, dovevano ritenersi i migliori di cui si potesse disporre. In certi campi speciali, comprendenti argomenti strettamente connessi, l'Ufficio nominò anche dei Redattori Speciali col compito di sorvegliare il lavoro e collaborare alla disposizione definitiva del materiale.

Nell'espletare il suo compito, l'Ufficio di Redazione ha potuto giovare della collaborazione di numerose organizzazioni e di numerose persone, le quali con consigli e suggerimenti vari sono state di grande aiuto nel portare a fine un lavoro che è stato certamente complesso e difficile. L'Ufficio è specialmente grato ai vari Redattori Corrispondenti e ai rispettivi Comitati Consultivi i quali hanno generosamente dato il loro tempo e la loro intelligenza al successo dell'opera, ai Redattori Speciali, al Bureau of Standards degli Stati Uniti, al National Physical Laboratory inglese e alla Société de Physique francese, alla Commissione Internazionale in carica per le Tabelle annuali e alle varie organizzazioni e persone che misero a disposizione degli Esperti dati inediti.

Infine i Membri dell'Ufficio desiderano manifestare l'alto apprezzamento che fanno dei contributi di tutti gli Esperti, il lavoro dei quali, compiuto in larga misura con entusiasmo e disinteressatamente, ha reso possibile queste tabelle; ed in particolar modo

Finally, the members of the Board desire to record their appreciation of the work of all of the Cooperating Experts whose contributions, largely a labor of love, have made these tables possible; and in particular, of the work of the Editorial Staff, Messrs. Washburn, Dorsey, and West, to whom indeed the utility of this collection of tables should be largely accredited.

George K. Burgess	S. C. Lind
Saul Dushman	C. E. Mendenhall
John Johnston	R. B. Moore.

organisations diverses et aux personnes qui ont procuré des données inédites à l'usage des Experts-coopérants.

Enfin, les membres du Comité désirent exprimer leur appréciation pour le travail de tous les Experts-coopérants dont les contributions, pour une large part désintéressées, ont rendu possible l'élaboration de ces Tables, et en particulier pour le travail des Rédacteurs, MM. Washburn, Dorsey et West, auxquels nous sommes en grande partie redevables des services que rendra cette collection de Tables.

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INTRODUCTION

International Critical Tables is the result of the cooperative labors of a large number of specialists, each of whom has been charged with the responsibility for the critical compilation of the quantitative information available on his topic. The word "critical" in this connection means that the Cooperating Expert was requested to give in each instance the "best" value which he could derive from all the information available, together, where possible, with an indication of its probable reliability.

Through a cooperative arrangement with International Annual Tables, the Board of Editors has been able to place in the hands of each Cooperating Expert the literature references belonging to his topic for the years 1910-1923 inclusive, as compiled by the staff of International Annual Tables. For the period preceding 1910, each Cooperating Expert was directed to collect the necessary literature references from the various published handbooks, special treatises, works of reference, and other sources known to him as a specialist in the field. No attempt has been made to systematically cover the literature since 1923, although a certain amount of information published since then has been utilized.

In preparing the various sections, the Cooperating Experts were instructed,

1. To include in the bibliography only (a) the sources of the data upon which their reported values actually rest, and (b) the sources of available data of the same kind pertaining to those systems for which no numerical value is given. It is not intended to be a complete bibliography of the field.
2. To omit from the tables of numerical data all those systems for which the available data (a) were of slight scientific or practical interest, or (b) were so discordant as to be of little, if any, value.
3. To set forth the results of their work in the form of text, equations, tables, graphs, or charts, as seemed most appropriate under the circumstances, having regard to the necessity of space economy.
4. To give only selected samples illustrating types in the case of very large and heterogeneous fields, such as colloids, chemical kinetics, and certain classes of industrial materials.
5. To restrict the accompanying explanatory text to the amount necessary for the intelligent use of the data. (Under this restriction, the Expert is given no opportunity to present a general discussion of his subject or of the methods by which he obtained the values given.)

In preparing the textual material for publication the Editors have been compelled, in the interest of economy of space, to enforce the restrictions imposed by sections 3 and 5 of the preceding paragraph and have freely rearranged and rewritten the text, whenever it was evident that a compression or an improvement in logical order could be so secured. With few exceptions, which are duly

INTRODUCTION

Les Tables critiques internationales sont le résultat du travail coopératif d'un grand nombre de spécialistes, chacun de ceux-ci ayant été chargé de la responsabilité de la compilation critique des informations disponibles sur son sujet. Le mot "critique" dans ce cas signifie que l'expert coopérant fut invité à donner dans chaque circonstance la "meilleure" valeur qu'il pouvait recueillir de toutes les informations disponibles, en ajoutant si possible une indication au sujet de la confiance probable qu'on pouvait avoir en elle.

Par le fait d'un arrangement coopératif avec les Tables annuelles internationales, le Comité des Rédacteurs a été en mesure de mettre à la disposition de chaque expert coopérant les références bibliographiques appartenant à son sujet de l'année 1910 à l'année 1923 inclusivement, celles-ci ayant été compilées par le Bureau des Tables annuelles internationales. Pour la période précédant 1910, chaque expert coopérant fut chargé de recueillir les références bibliographiques nécessaires en usant des manuels variés publiés, des traités spéciaux, des ouvrages de références, et d'autres sources connues de lui en sa qualité de spécialiste du sujet traité. En ce qui concerne la littérature depuis 1923, aucune tentative n'a été faite pour la couvrir d'une façon systématique; un certain nombre d'informations postérieures à 1923 ont cependant été utilisées.

Pour la préparation des différentes sections, il fut recommandé aux experts coopérants:

1. D'inclure dans la bibliographie seulement (a) les sources de valeurs sur lesquelles reposent actuellement leurs valeurs reportées, et (b) les sources des données de même nature appartenant aux systèmes pour lesquels aucune valeur numérique n'est donnée. Le but poursuivi n'est pas de constituer une bibliographie complète du sujet.
2. De ne pas introduire dans les tables de valeurs numériques tous les systèmes pour lesquels les valeurs disponibles (a) sont de peu d'intérêt scientifique ou pratique, ou (b) sont par trop discordantes pour être d'une valeur quelconque, si toutefois elles en présentent une.
3. De disposer les résultats de leur travail sous la forme d'un texte, d'équations, de tables, de graphiques ou de cartes, en employant le moyen qui leur parut le mieux approprié suivant les circonstances, en ayant en vue la nécessité d'économiser de la place.
4. De ne donner que des exemples choisis, illustrant les types, dans le cas d'un champ très vaste et hétérogène, tel que: les colloïdes, la cinétique chimique et certaines classes de matières industrielles.
5. De restreindre le texte explicatif accompagnant les données au strict nécessaire pour la compréhension de celles-ci. (Vu cette restriction, l'expert n'a donc pas l'occasion de présenter une discussion générale de son sujet et des méthodes par lesquelles il a obtenu les valeurs données).

einigungen und Freunden, die noch nicht veröffentlichten Daten der Mitarbeiter zur Verfügung stellten.

Schliesslich möchte die Redaktions-Kommission die Anerkennung den Mitarbeitern ausdrücken, deren Arbeitsfreudigkeit diese Tafeln möglich machten, im besondern aber auch der Mithewaltung des Redaktionsstabes der Herrn Washburn, Dorsey und West, denen man vorwiegend den Erfolg und die Nutzbarkeit dieses Tabellenwerkes schulden muss.

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ricordano l'opera dei dirigenti dell'Ufficio di Redazione, Sigg. Washburn, Dorsey, e West ai quali soprattutto si deve essere grati per l'utilità che si avrà dalla presente raccolta di tabelle.

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EINLEITUNG

Die Internationalen kritischen Tafeln stellen die Ergebnisse des Zusammenwirkens einer grossen Zahl von Mitarbeitern mit besonderen Erfahrungen dar, die mit der Aufgabe betraut wurden, die erreichbaren Daten des entsprechenden Gebietes kritisch darzustellen. In dieser Verbindung bedeutet das Wort kritisch soviel, dass der Mitarbeiter gebeten wurde, in jedem einzelnen Fall die "besten" Werte zu geben, die er auf Grund aller zur Verfügung stehenden Literaturstellen, ableiten konnte, zugleich ferner, wenn möglich, alle Angaben mit dem Grade ihrer Zuverlässigkeit zu vermerken.

Durch ein Übereinkommen mit der Redaktion der Tables annuelles konnte die Redaktionskommission jedem einzelnen Mitarbeiter, über seinen Gegenstand die Literatur der Jahre 1910 bis einschliesslich 1923 soweit übergeben, als sie durch die Redaktion der Tables annuelles ausgearbeitet worden ist. Für die Zeit vor 1910 wurde ein jeder Mitarbeiter gebeten, die notwendigen Literaturstellen und Daten aus den verschieden vorhandenen Handbüchern Spezial- und Nachschlagewerken und anderen, ihm als besonderem Kenner auf diesem Gebiete erreichbaren Quellen, zu sammeln. Es ist nicht versucht worden, die Literatur seit 1923 noch systematisch darzustellen, obwohl ein gewisser Teil davon noch Berücksichtigung finden konnte.

Bei der Bearbeitung der verschiedenen Abschnitte erhielt der Mitarbeiter folgende Anweisungen:

1. Als Literatur sind (a) nur diejenigen Stellen anzugeben, auf Grund deren die angegebenen Werte besonders folgerten, (b) die Quellen, über denselben Gegenstand, die aber keine numerischen Daten enthalten, die Verwendung gefunden haben.

2. Es sind in den Zahlenangaben der Tafeln alle diejenigen Systeme wegzulassen, deren vorliegende Daten, (a) von geringem wissenschaftlichen und praktischen Werte sind, oder (b) die Daten sind so widersprechend, dass sie, wenn überhaupt, von geringem Werte sind.

3. Die Ergebnisse ihrer Arbeit sind in einer solchen Form darzustellen, dass durch den Text, die Gleichungen, Tabellen und Tafeln mit Rücksichtnahme auf Raumersparnis, der Zweck am besten erfüllt wird.

4. In sehr grossen, heterogenen Gebieten wie in denen der Kolloide, der chemischen Kinetik und in gewissen Fällen von technischer Bedeutung, sind nur ausgewählte Beispiele zu geben, die das Gebiet charakterisieren sollen.

5. Der erläuternde Text ist soweit zu beschränken, dass eine sachgemässe Verwertung der Tafeln noch möglich ist. (Bei dieser Einschränkung hat der Experte nicht die Gelegenheit allgemein seine Aufgabe, noch die Methode, darzustellen, nach welchen er seine Angaben erhalten hat.)

INTRODUZIONE

Le Tabelle Critiche internazionali sono il frutto della collaborazione di un gran numero di specialisti a ciascuno dei quali è stato affidato il compito di vagliare i dati disponibili sopra un determinato soggetto. La denominazione di tabelle "critiche" indica che l'esperto è stato incaricato di dare in ogni caso il valore "migliore," deducibile da tutte le notizie che si hanno a disposizione. Tutte le volte che è stato possibile l'esperto è stato incaricato anche di dare indicazioni sul grado di attendibilità dei valori numerici.

In seguito ad accordi intervenuti con le Tabelle annuali internazionali, l'ufficio di Redazione ha potuto fornire a ciascun esperto le indicazioni bibliografiche riferentisi agli anni dal 1910 al 1923 incluso, quali vengono compilate dalla direzione delle Tabelle internazionali. Per gli anni precedenti al 1910, gli esperti vennero consigliati a raccogliere la letteratura dai vari manuali, trattati speciali, lavori bibliografici e da altre fonti ad essi note data la qualità di ognuno di specialista in un determinato campo. Dei dati pubblicati dopo il 1923 si è tenuto conto solo in parte.

È stato raccomandato agli esperti che, nel preparare le varie parti:

1. Includessero nella Bibliografia soltanto: (a) le fonti delle indicazioni sulle quali sono basati i valori riportati, e (b) le fonti delle indicazioni riguardanti i sistemi per i quali non viene dato nessun valore. Non si è riportato inteso una bibliografia completa del soggetto.

2. Omettessero nelle tabelle delle grandezze numeriche tutti quei sistemi per i quali i dati disponibili; (a) fossero di poco interesse scientifico o pratico, oppure (b) fossero così in disaccordo da essere di poco o di nessun valore.

3. Esponessero, a seconda dei casi, i risultati del loro lavoro in forma di testo, di equazioni, di tabelle, di grafici, o di tavole tenendo presente la necessità di economia di spazio.

4. Riportassero soltanto esempi tipici nei campi molto vasti ed eterogenei come colloidi, cinetica chimica ed alcune classi di prodotti industriali.

5. Limitassero il testo esplicativo a quel tanto sufficiente per un uso intelligente delle tabelle (data questa limitazione, all'esperto non è stato consentito di redigere una esposizione generale del suo soggetto o dei metodi con i quali egli ha ottenuto i valori che riporta).

Nel preparare il testo per la pubblicazione i Redattori sono stati obbligati, per economia di spazio, ad applicare le restrizioni imposte nei capoversi 3 e 5 del precedente paragrafo, ed hanno liberamente cambiato disposizione e forma al testo, ogni qualvolta era evidente che potesse derivarne un miglioramento. Salvo poche eccezioni, tutte indicate la forma definitiva del testo è stata sottoposta alla approvazione dell'Esperto.

noted, the final form of the rewritten text was submitted to the Expert and was accepted by him.

In preparing the numerical data for publication the Editors have made no change except in their arrangement and in their mode of presentation. In making such changes the Editors have been guided by the necessity of saving space. The numerical data are in all cases those submitted by the Expert, excepting that (a) a few additional values, all duly indicated, have been inserted, and (b) when an Expert has submitted a number of values for the same nominal quantity, these have been grouped so as to make a single entry with an indication of the range covered by the values submitted, whenever such grouping seemed justifiable. In these cases, the final manner of grouping was in every case where possible submitted to and accepted by the Expert. The exceptional cases are noted as they occur.

Owing to the method of publication, *i.e.*, one volume at a time, a strictly logical arrangement of subject matter is not always followed. Among such a large number of Cooperating Experts a few instances of greatly delayed reports, arising from illness, accident, or other unforeseen causes, are to be expected; and certain sections or parts of sections, therefore, may not appear in their logical places but will be found in a later volume. The whole set of volumes is very completely indexed, however, and the user who consults the index should have no difficulty in locating any information given.

Chemical compounds are arranged in the tables by formula according to a definite system, called the "Standard Arrangement." This system is based upon a set of key numbers for the chemical elements and is fully explained in Volume One.

In order to find a given substance in the longer tables it is therefore necessary to know its chemical formula, at least approximately. If only the name is known, the formula, for most organic compounds or minerals, may be found with the aid of the name indices in Volume One, p. 174 and 280.

Pour la préparation du texte destiné à la publication, les rédacteurs se sont vu obligés, afin d'économiser encore de la place, d'accentuer encore les restrictions imposées dans les sections 3 et 5 du paragraphe précédent et ils ont pris la liberté de ré-arranger et de ré-écrire le texte partout où il était évident qu'une compression ou une amélioration dans l'ordre logique pouvait ainsi être réalisée. A part de rares exceptions, qui sont du reste dûment notées, la forme définitive du texte ré-écrit fut soumise à l'expert et acceptée par lui.

En disposant les données numériques pour la publication, les rédacteurs n'ont fait aucune modification, excepté en ce qui concerne l'arrangement et le mode de présentation. En faisant ces changements, les rédacteurs ont été guidés par la nécessité d'épargner de la place.

Les données numériques sont dans tous les cas celles fournies par les experts, à l'exception (a) d'un petit nombre de valeurs, toutes dûment indiquées, qui ont été insérées, et (b) lorsqu'un expert a soumis un certain nombre de valeurs pour la même quantité nominale, ces valeurs ont été groupées de façon à constituer une entrée unique, avec une indication du range occupé par les valeurs fournies, toutes les fois qu'un tel groupement paraissait indiqué. Dans ces cas, la forme définitive du groupement fut, partout où cela était possible, soumise à l'expert et acceptée par lui. Les cas exceptionnels sont notés lorsqu'ils se présentent.

Étant donné le mode de publication par un volume à la fois, un arrangement strictement logique de la matière traitée n'est pas toujours possible. En effet, avec un tel nombre d'experts co-opérants, il faut s'attendre à ce qu'il y ait quelques circonstances imprévues, telles que maladies, accidents ou autres causes, occasionnant un grand retard dans la remise des rapports; c'est pourquoi certaines sections ou parties de sections ne peuvent paraître à leur place logique mais se trouveront dans un volume suivant. Cependant, la série complète des volumes étant indexée d'une façon très détaillée, le lecteur qui consulte la table des matières n'aura aucune difficulté pour repérer toute information donnée.

Les composés chimiques sont disposés dans les tables suivant leurs formules et cela d'après un système défini appelé "arrangement type." Ce système est basé sur une suite de "nombres clés" pour les éléments chimiques, et il est expliqué d'une façon complète dans le volume I.

Afin de trouver une substance donnée dans les longues tables, il est nécessaire de connaître sa formule chimique au moins approximativement. Si le nom seul est connu, la formule peut être trouvée pour la plupart des composés organiques ou des minéraux au moyen des noms indices qui se trouvent dans le volume I, p. 174 et 280.

Bei der Zusammenstellung des Textes für die Veröffentlichung waren die Herausgeber gezwungen, im Interesse der Raumerparnis die unter 3 und 5 oben angegebenen Richtlinien besonders zu betonen. Sobald erkannt wurde, dass eine Zusammenziehung und eine Verbesserung in der logische Anordnung möglich sei, wurde der Text frei zusammengestellt und frisch geschrieben. Mit wenigen Ausnahmen, welche besonders bezeichnet sind, wurde die entgültige Form des neu geschriebenen Textes dem Experten vorgelegt und von ihm angenommen.

Bei der Vorbereitung des Zahlenmaterials für die Veröffentlichung änderten die Herausgeber nichts, ausgenommen war nur dessen Anordnung und die Form der Darstellung, wobei man sich von der Notwendigkeit, Raum zu sparen, leiten liess. Die Zahlenwerte sind in allen Fällen dieselben, welche vom Experten vorgelegt, ausgenommen, (a) dass einige ergänzende, besonders bezeichnete Werte hinzugefügt wurden und (b), wenn der Experte für dieselbe quantitative Grösse mehrere Werte angegeben hat. Diese wurden dann, sobald ein solches Vorgehen gerechtfertigt war, zusammengestellt, so, dass nur eine Zahl, mit den Grenzen hingeschrieben werden konnte, welche durch die Werte gegeben sind. In so einem Falle wurde die Endform der Anordnung jedesmal dem Experten, wo möglich vorgelegt und von ihm angenommen. Die Ausnahmefälle sind dorten wo sie vorgekommen bezeichnet.

Entsprechend der Publikationsmethode, der Herausgabe eines Bandes zu einer bestimmten möglichen Zeit, konnte eine genaue logische Anordnung eines bestimmten Kapitels nicht numer erreicht werden. Unter einer so grossen Zahl von Mitarbeitern sind Fälle zu erwarten, wo sich einige Artikel stark verzögern werden, sei es durch Krankheit oder andere unvorhergesehene Ursachen. Deshalb werden gewisse Abschnitte oder deren Teile nicht an ihren richtigen Plätzen erscheinen, sondern sie können in einem späteren Band gefunden werden. Die ganze Bänderfolge ist mit einem sehr vollständigen Verzeichnis versehen und der Leser, welcher das Verzeichnis benützt, wird keine Schwierigkeit haben, Vorhandenes aufzufinden.

Die chemischen Verbindungen sind in den Tafeln nach einem Formelsystem angeordnet, das als "Normalanordnung" (Standard Arrangement) bezeichnet wird. Dieses System, das im ersten Bande vollständig erklärt wird, beruht darauf, dass für die chemischen Elemente Schlüsselnummern gewählt werden.

Um im den längeren Tafeln eine gegebene Substanz aufzufinden, ist es notwendig, deren chemische Formel wenigstens annähernd zu kennen. Ist nur der Name bekannt, so kann die Formel der meisten organischen Verbindungen und der Minerale, mit Hilfe des englischen Namenverzeichnisses im Bande I Seite 174 und 280 gefunden werden.

Nell'allestire i dati numerici per la pubblicazione i Redattori hanno fatto cambiamenti solo nel modo di disporli e di presentarli. Nel fare questi cambiamenti i Redattori sono stati guidati dalla necessità di risparmiare spazio. I dati numerici sono in tutti i casi quelli forniti dall'Esperto; solo qualche volta sono stati aggiunti alcuni pochi valori, tutti bene indicati, e qualche altra, avendo l'Esperto riportato parecchi valori per una stessa grandezza, questi—allorchè è sembrato giustificato il farlo—sono stati raggruppati indicando un solo numero ed i limiti entro i quali oscillano i valori considerati. In questi casi, la disposizione finale, fu sempre, quando possibile, sottoposta all'approvazione dell'Esperto. Tutte le volte che è stato fatto diversamente, lo si è indicato.

Siccome le tabelle vengono pubblicate un volume alla volta, non sempre la disposizione della materia è fatta in modo strettamente logico.

Dato il numero grande di Esperti, è da aspettarsi che qualche rapporto sarà presentato con grande ritardo a causa di malattie o di incidenti imprevedibili. Certe parti perciò potranno comparire non nel posto che logicamente ad esse spetterebbe, ma in volumi posteriori. Tutti i volumi sono però muniti di indici accurati e il lettore, consultandoli, non avrà difficoltà a rintracciare una notizia qualunque.

I composti chimici sono disposti nelle tabelle in base alle formule seguendo un sistema chiamato "disposizione Standard." Questo sistema è fondato sopra una serie di numeri chiave assegnati agli elementi chimici ed è esaurientemente spiegato nel primo volume.

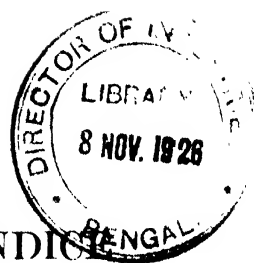
Per poter quindi trovare una data sostanza nelle tabelle più lunghe, è necessario conoscerne la formula chimica, almeno approssimativamente. Se si conosce solo il nome, la formula si può trovare (per la massima parte dei composti organici o minerali) con l'aiuto degli indici per nome contenuti nel 1° volume p. 174 e 280.

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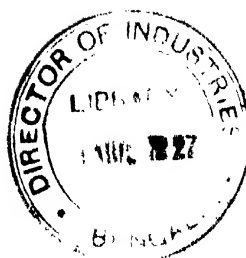
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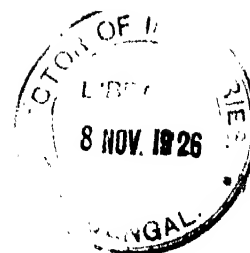
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xviii & xix	Ready Reference Tables. Between (c) and (d) insert Boiling points (morgans) 162 To (d) entry add 163, 276	155	Index No. 2068. For 06 read 256 d.
	Between (d) and (e) insert Index to minerals 174.	155	Index No. 2094. For $K_2CaH_2O_8$ read $KCaH_2O_8$.
	Index to C-Table 280	165	Serial No 1. For 1 833 read 1 1833
4	Column 4. For Columbia read Colombia	174	Column 1. For Apophite read Apophite.
7	Column 3, under Mass. For 453 592 45 read 453 592 43. For 64 708 182 read 64 708 9182		Delete Arsenic siderite
8	Column 1, 1 bushel. For 45 367 70481 read 36 367 70481		Column 2, Automolite. For 1119 read 1011.
10	Column 1. For 1 mnl = 10 & read 1 mnl or total = 9 843 or 10 &		Column 3. For Cerargyllite read Cerargyrine
12	Column 2. For 1 shu read 1 shu		Column 4. For Chrysotile read Chrysotile.
	1 fannu read 1 fannu		For Cotunnite read Cotunnite
	1 stang = 16 read 1 stang = 10 or 16		Column 5. For Durfeldite read Durfeldite
	Column 3, under Mass read skilpund		Column 6. For Eriochalite read Eriochalite.
	For skilpund read 1 pes	175	For Eriochalite read Eriochalite.
	1 quanta read 1 kvintin		For Georocrite read Georocrite
	1 uniz read 1 mis		For Jernegerite read Jernegerite.
	1 nylast = 12 000 read 1 nylast = 10 000 or 12 000		Column 3. For Molybdophyllite read Molybdophyllite
	1 ort = 100		After Molybdate insert Monante, 1990
	Column 3, under Capacity, dry		Column 4. For Phosphochalite read Phosphochalite
	Delete 1 ort = 1		Polante. For (Pyrosulite) read (Pyrosulite)
	For 1 junkfra read 1 junkfra or junkfra		Column 5, Scholite. For 2480 read 2360.
	1 quarter read 1 kvarter		After Spencerite insert Sperryite, 1179
	1 knapier read 1 knapie		Column 5. For Sxomolokite read Sxomolokite
	1 ferdinger read 1 fjd ring		For Tenante read Tenantite
	1 spauha read 1 spauin		After Tenantite insert Tenantite, 1083.
13	Column 1, 1 snah. For 1/2 read 1/2		For Ura-lagite read Uralagite
17	Column 1, (v). For p 27 read p 38	176	Index No. 20. Delete 2 53.
	Accepted Basic Constants. Regarding Uncertainty column add	179	Index No. 232. Delete 1 7
	These values are rough estimates and those for e, p, m and h	180	Index No. 263. For 1 017 read 0 0006
	should probably be several times as great as the values given	183	Index No. 435. For $NH(COCH_3)_2$ read $NH_2CONHCOCH_3$.
18	Section A. These Derived Constants have been computed from	187	Index No. 085. For - 18 read - 5
	the Accepted Basic Constants on p 17, and are vitiated by the	188	Index No. 725. For CH_3COCH_3 read $CH_3CO_2CH_3$.
	errors in those values. The greatest errors occur in v_m and		Index No. 773.1. For Methyl read Methyl
	N_{av} , which differ from the best experimental values by about	192	Index No. 1012. For $C_2H_5CO_2H$ read $C_2H_5CO_2H$
	0.4 %; the computed value of v_m being too small	193	Index No. 1074. For Dimethyl read Dimethyl
	For v_m read v_m	200	Index Nos. 1466, 1508, and 1570. Data probably not for pure
	Section B, logio A. For 1 808 7827 read 3 808 7827		compounds α -Dihydrobenzene and 1, 3-cyclohexadiene are
23	Table 28, last line. For 15 5951 read 14 5951. For 1 192 9882	214	two names for the same compound.
	read 1 133 3824.		Index No. 2328. Delete entry.
26	Table 48. For 1 0000 Lambert 0.000 0000		Index No. 2330. For - 126 & read - 120 &
	1.0704 millilambert 0.031 0684		100 &
	read 3 1416 Lambert 0.407 1199		100 &
	3 3810 millilambert 0.529 1183		0.704
34	Column 2, line 1. For 980 655 read 980 655	220	Index Nos. 2710, 2720, and 2721. For Crotyl read Toly.
42	Column 1. For Synodol read Synodol	224	Index No. 2042. For 2-Ethylhexane $CH_3(CH_2)_3CH_2CH_2$ read
49	Column 1. For X read X		3-Ethylhexane $(CH_3)_2CHCH_2CH_2CH_2CH_3$.
52	For F. O. Fairchild read C. O. Fairchild		Index No. 2042.1. Delete entry.
62	Column 2. For above 20° read below 20°	237	Index No. 3123. For CaH_2O_2 read CaH_2O_2
66	Section (a), Phosphorus pentasulfide. For 52° read 523°	238	Index Nos. 3150, 3151, and 3152. For Crotyl read Toly.
91	High Vacuum Technique		Index No. 3576. For $CH_3CH_2CH_2CH_2CH_2CH_2C_2CH_3$ read
	line 1, for Amount read Mass		Index No. 3635. For Benzacetin read 5-Acetylaminomethoxy-
	line 6, after molecules add striking 1 cm ³ sec ⁻¹		benzene-1-carboxylic acid
	line 11, for Q = amount read Q = volume	238	Index No. 3848. For C_2H_5O read $(C_2H_5O)_2$
102	The Gaseous State, viscosity column		152 12
	A, for 221 read 222		205
	Br, for 155 read 154.		310
	Air, for 281 2 read 180 8	Index No. 3802. For $(C_2H_5O)_2$ read $(C_2H_5O)_2$	
106	Line 1. For Sautere read Smither.		152 12
	Line 3. For John C. W. Frazer read J. C. W. Frazer		205
	Index No. 6. For -76 read -59	242	Index No. 4078. Add 5-Acetylaminomethoxybenzene-1-car-
	Index No. 35.1. Delete 1 in density column for 3182°		boxylic acid
109	Index No. 204, d ₂₀ . Add 3 022	247	Index No. 4304. 1 525 is the density for the monohydrate
	Index No. 205, d ₂₀ . Add 4 49	253	Index No. 4734. For Crotyl read Toly. For $p-CH_3C_6H_4O_2CC_6H_5$
	Index No. 206, d ₂₀ . Add 3 63.		read $p-CH_3C_6H_4O_2CC_6H_5$
	Index No. 259. Delete entry.	254	Index Nos. 4730, 4741, 4742, and 4744. For Crotyl read Toly.
110	Index No. 500. For Attate read Attate		Index Nos. 4778, 4779, and 4780. For Crotyl read Toly.
115	Index No. 766. Delete entry.	258	Index No. 5057. For $C_2H_5N_2$ read $C_2H_5N_2$. For 233.12 read
119	Index No. 767. For 45 5 read 44 07.		127 124
122	Index No. 910. Add Eriochalite.	260	Index No. 5152. For capronate read capronate.
	Index No. 1001. For Phosphochalite read Phosphochalite	262	Index No. 5291. For Clauonal read Quinolol.
128	Index No. 1354. For Sxomolokite read Sxomolokite.	266	Index Nos. 5547, 5550. For Jolemine read Jolemine.
	Index No. 1355. For Siderotilite read Siderotilite.	268	Index No. 5653. For Styryline read Styryline.
129	Index No. 1394. For $FeCO_3 \cdot H_2O$ read $FeCO_3$. For 133 855 read	269	Index No. 5711. For Golemine read Golemine.
	115 84.	270	Index No. 5779. For α -Crotyl read α -Tritolyl.
131	Index No. 1507. For 2 8184 read 4 13	271	Index No. 5902. Delete entry.
133	Index No. 1631. For Crocotite read Crocotite.	272	Index No. 5928. For $C_2H_5O_2$ read $C_2H_5O_2$.
134	Index No. 1683. Insert Tungstenite.		612 25
	Index No. 1726. For UO_2CO_2 read UO_2CO_2		190
136	Index No. 1819. For BN_2CO_2 read BN_2CO_2	274	Index No. 5907. For Octononane read Octononane.
139	Index No. 1980. Insert Monante.		Index No. 6054. For capronate read capronate.
143	Index No. 2236. For Hydrophyllite read Hydrophyllite	275	Index No. 6082. For Filixie read Filixie.
149	Index No. 2622. For d 29 6 read 29 88		Index No. 6090. Delete entry.
152	Index No. 2807. Probably a dehydrate, r. Conroy, 54, 17: 104;	278	Index No. 6110. For caprinite read caprinite.
	98	280	Serial No. 910. Delete entry.
153	Index No. 2877. For 3.55 read 2.55.		Column 3. After p-Acetylaminobenzoic acid insert
			5-Acetylaminomethoxybenzene-1-carboxylic acid, 4078.
			Column 4. After α -Acetylaminomethoxybenzene insert
			5-Acetylaminomethoxybenzene-1-carboxylic acid, 3635.
		282	Column 4, Benzacetin. Delete 3635.
		285	Column 1. For Cerobrin, 5931, 6153 read Cerobrin, 5931
			Cerobrin, 6153

PAGE		PAGE	
286	Column 3. Delete 14 entries, beginning with <i>o</i> -Cresyl acetate 3150 and ending with <i>p</i> -Cresyl salicylate, 4743. Delete <i>o</i> -Cresol orthoacetate, 5779.	362	Column 2, line 8. For $V = 0.0342a^{1/2}$ read $V = 0.0342a^{1/4}$. Above Remarks Concerning the Nomenclature there should be a rule extending across entire page.
290	Column 4. After <i>m</i> -Cymene insert <i>p</i> -Cymene, 3728 1	363	Column 2, Note 9. For DAI read DAJ.
291	Column 4, Ergosterol. Delete 5902	364	Series of Thorium, Thoron. For 0.574 read 0.0574
	Column 3. Delete 2 Ethylhexane, 2042	366	Column 2, Tables (b) and (c). For cm^{-1} read cm^2 .
	<i>n</i> -Ethylhexane. For 2042 1 read 2042		Chemical Effects of α -Particles, column 1, line 3. After α -particles insert in the time the M are reacting
292	Ethyl hippurate. For 4510 read 4077 1		equation, line 12. For \ln read \log_e
	Column 2, Filix acid. For 0006 read 0082	368	Column 1, line 4. For $T_{1/2}$ read T (cf. p. 362, column 1, line 14).
	Filix acid. Delete entry.		
	Column 3. For Gelsamine, 5711 read Gelsamine, 5547	372	Column 2, Literature
295	Gelsamine, 5711		(4). For 181:1751 read 180:1750.
	Gelsamine hydrochloride, 5550		(10). 10:11 11:628
300	Column 4, <i>N</i> -Phenylthiourea. For 321 read 3201	373	Lat. column. For (99) read (98).
301	Column 4, Pyrene. For 5206 read 5026	375	Lat. column. For (97) read (96).
302	Column 2. After Quinoxaline insert Quinoxal, 5291	376	Column 2. For Japan (43) read Japan (41).
303	Column 1. Terephthalic acid. Delete entry.	377	Column 2, <i>Hokkaido</i> . For (43) read (41).
304	Column 2. After Toluylene-3, 6-diamine insert		Column 2, S. For Skaldovskite read Sklodovskite.
	<i>m</i> -Tolyl acetate, 3151		Column 2, <i>Torberite</i> . For (U ₂ CaPO ₄) read (U ₂ CaPO ₄)
	<i>p</i> -Tolyl acetate, 3152		Column 2, Y. For Ytrotantalite read Ytrotantalite.
	After <i>p</i> -Tolylanthracene insert	379	Oceanic Deposits. Data from (138) have been superseded by the author's later work (July, 3, 24:691,12) and should read.
	<i>m</i> -Tolyl benzoate, 4736		
	<i>p</i> -Tolyl benzoate, 4734		
	After <i>p</i> -Tolylidimethylpyrazolone insert		
	<i>o</i> -Tolyl ether, 4778		
	<i>m</i> -Tolyl ether, 4779		
	<i>p</i> -Tolyl ether, 4780		
	After <i>p</i> -Tolyl isothiocyanate insert		
	<i>o</i> -Tolyl methyl ether, 4749		
	<i>m</i> -Tolyl methyl ether, 4740		
	<i>p</i> -Tolyl methyl ether, 4741		
	After <i>p</i> -Tolyl mustard oil insert		
	<i>o</i> -Tolyl salicylate, 4741		
	<i>m</i> -Tolyl salicylate, 4742		
	<i>p</i> -Tolyl salicylate, 4743		
305	Column 3. After Trithioglycerol insert <i>o</i> -Tritolyl orthoacetate, 5779.		
306	Column 2, Xanthine. Delete entry		
307	Property-Substance Tables. —150. Delete 2328	380	The Loeschberg Tunnel. For Aplete read Aplite.
308	90: For 1516 read 4077 1.	381	Meteorites, Remarks. For hexahydrite read hexahedrite
	90: Delete 32908.		Column 1, line 2 of table. For Anondoga read Onondaga
310	110: After 33347 insert 07.		Column 2, (138). For July, 3, 16:190.18 read July, 3, 16:190.08.
	200: After 4931 insert 32968.	382	Lines 2 and 3 of table. For Felixtowe read Felixtowe.
	201: Delete 3862.		Line 16 of table. For Friar read Friar
	200: After 2620 insert 3862.		Line 20 of table. For Charnokite read Charnockite
	200: Delete 3848.	392	Characteristics of Members of Solar System
	210: After 1385 insert 3846.		Sidereal rotation of Sun. For 25.3 read 25.0
311	90: Delete 171		Number of satellites. Mars. For 0 read 2
	100: Delete 2328		Jupiter 7 9
	110: Delete 2042.1.		Saturn 9 10
	110: Delete 67.		Column 1, line 2 bottom. For 24 da and 30 da read 24.5 da and 30.6 da, respectively.
313	100: For 4516 read 4077 1		Column 2, Constant of notation. For notation read nutation.
319	0.760: Delete 2328 and 2330		Column 2, Constant of aberration. Add this note. Astronomers now generally accept a value near 20.52, but the Paris conference value is used in the computation of the national ephemerides.
	C ₁₂ H ₁₄ O ₈ . For capronate read caproate		Column 2, Solar parallax. Add this note. The direct determination (8806'') is by far the most reliable, the one from the velocity of light is based upon the value for the constant of aberration adopted at the Paris conference of 1896, which is smaller than the value now generally accepted. The two others are from the nature of the case somewhat uncertain.
322	C ₁₂ H ₁₄ O ₈ . H ₂ O. For Strontium disulfonate read Strontium ethane disulfonate		Column 2, Inclination of Moon's orbit to ecliptic. For about 5° read 5° 8' 43"
331	C ₁₂ H ₁₄ O ₈ N. For Glutamic aniline read Glutaramide	394	Table 1, item 6. For meridional read meridional
333	(448). Susahara. For 329 read 210	398	Column 1, Greenwich, g . For 981 184 read 981 188
358	Odoriferous Materials, Classification		Column 1, Kew, g . For 981 144 read 981 201
	For fragrant (1) read fragrant		
	Allyl. Allaceous		
	empyreumatic. empyreumatic		
	tetr. tetr.		
	naucois. naucois		
360	Column 1, line 3. For 6.06×10^{11} read 6.06×10^{13}		
	Columns 1 and 2, table heading. For Molecules per cc read Molecules per 0.01 cm^3		

	No. specimens	Re. mean
Blue mud		
1210 fath	1	1.6
"Ooze"		
720 fath . . .	1	1.7
Globigerina ooze		
190 to 2493 fath . . .	4	3.3
3 of above sample s		3.1
Radolarians ooze		
2600 to 2750 fath	2	13.1
Red clay		
2350 fath . . .	1	11.0



INTERNATIONAL CRITICAL TABLES

NATIONAL AND LOCAL SYSTEMS OF WEIGHTS AND MEASURES

CHARLES-ÉDOUARD GUILLAUME AND CHARLES VOLET

Plan.—Section A: International Metric System; list of countries in which its use was compulsory on January 1, 1925, list of those in which its use was either legally optional or partially compulsory on same date.

Section B: Other modern systems; the more important units at present in use or in use before adoption of metric system.

Section C: Weights and measures of antiquity.

Style and Abbreviations.—Only the singular number of the names of the units are used; ten meters will appear as 10 meter. Units of area and of volume will be written in the form centimeter² (= cm²) and centimeter³ (= cm³), respectively.

- l.** Value given is only approximate.
- h.** Units have changed from time to time.
- m²** Square centimeter = centimètre carré = Quadratzenzimeter = centimetro quadrato.
- current** Units, other than metric, which are now in use; some of the units included in this class are practically obsolete. (See Local.)
- local** Units of local or native origin or derivation which are in use, but which are embraced neither by the metric system nor by that of the central government. Applies mainly to colonial possessions (See Current.)
- m³** Cubic meter = mètre cube = Kubikmeter = metro cubico.
- i. c.** International metric system compulsory since . . .
- o.** International metric system legally optional since . . .
- older** Units used before adoption of international metric system.
- older =** The older units were those of . . .
- provincial** Units vary from one province or city to another
- since =** . . . Since . . . the units have been the same as those of . . .
- l.** Vide = see.
- var.** Units are variable, not rigidly defined.

A. INTERNATIONAL METRIC SYSTEM

The decimal metric system, established in France by the Loi du 7 Avril, 1795, and represented by standards deposited in the Archives de France, became international on May 20, 1875, by the action of the Convention Internationale du Mètre. The new standards, of platinum-iridium, constructed at that time and serving as the basis of the international system, were copied from those of the Archives.

On January 1, 1925, the metric system was compulsory in:

Algeria	Greece	Peru
Allemagne	Gunn	Poland
Argentina	Guatemala	Porto Rico
Austria	Haiti	Portugal and colonies
Autriche	Holland	Rumania
Belgium	Honduras	Roussin
Bolivia	Hungary	Salvador
Brazil	Iceland	Schweden
Bulgarin	Italy & colonies	Schweiz
Chile	Japan	Serbic-Croatie-Slovénie
Colombia	Kolumbien	Seychelles Islands
Congo, Belgian	Kongo, Belgisch	Siam
Costa Rica	Kuba	Spain
Cuba	Luxemburg	Stade
Czechoslovakia	Malta	Suisse
Denmark	Mauritius	Sveizla
Deutschland	Mexico	Svizzara
Denudor	Netherlands & colonies	Sweden
Equateur	Nicaragua	Switzerland
Espagne	Norway	Tchécoslovaquie
Filipino	Olanda	Tunis
Finland	Österreich	Ungarn
France	Panama	Ungheria
Germany	Pap-Ras & colonies	Uruguay
Grèce	Philippine Islands	Venezuela
		Yugoslavia

On the same date, it was legally optional or partially compulsory in:

Canada	Great Britain	Irish Free State
China	India, British	Paraguay
Egypt	Ireland, Northern	Turkey
Ethiopia		United States of America

The fundamental units are: **METER (m)**, which is the distance at 0°C between the axes of two lines ruled on the prototype deposited at the Bureau international des Poids et Mesures, Sèvres, France; **KILOGRAM (kg)**, which is the mass of the prototype deposited at the same Bureau; and **LITER (l)**, which is the volume of one kilogram of pure water at the temperature of its maximum density, under the pressure of one normal atmosphere.¹

The primary units of the system are the *meter (m)*, *micron (μ)* = 10⁻⁶ meter, *gram (g)* = 10⁻³ kilogram, *liter (l)*, *are (a)* = area of a square with a side 10 meter long, and *stere (s)* = volume of a cube with an edge one meter long. The units of area [of volume], characterized by the adjective square [cubic], are *not* derived from a primary unit, but are each defined as the area [volume] of a square [cube] with side [edge] equal to the stated unit of length. The names of other secondary units are formed by attaching to the name of a primary unit certain prefixes of unvarying significance.

¹ Normal atmosphere, see p. 18.

Secondary units.

LENGTH m = meter		
μ	micron*	$= 10^{-6}$ m
mm	millimeter	$= 10^{-3}$ m
cm	centimeter	$= 10^{-2}$ m
dm	decimeter	$= 10^{-1}$ m
dkm	dekameter	$= 10$ m
hm	hectometer	$= 10^2$ m
km	kilometer	$= 10^3$ m
Mm	myriameter	$= 10^4$ m
	megameter	$= 10^6$ m

* $m\mu$ millimicron $= 10^{-5}$ m $\mu\mu$ micromicron $= 10^{-12}$ m

MASS g = gram		
μg *	microgram	$= 10^{-6}$ g
mg	milligram	$= 10^{-3}$ g
cg	centigram	$= 10^{-2}$ g
dg	decigram	$= 10^{-1}$ g
dkg	dekagram	$= 10$ g
hg	hectogram	$= 10^2$ g
kg	kilogram	$= 10^3$ g
q	metric quintal	$= 10^2$ kg
t	metric ton	$= 10^3$ kg
c	metric carat	$= 200$ mg

* Symbol γ also used

CAPACITY l = liter $= 1/1000$ 0.27 dm ³		
μl *	microliter	$= 10^{-6}$ l
ml	milliliter	$= 10^{-3}$ l
cl	centiliter	$= 10^{-2}$ l
dl	deciliter	$= 10^{-1}$ l
dkl	dekaliter	$= 10$ l
hl	hectoliter	$= 10^2$ l

* Symbol λ also used

AREA m ² = square meter		
mm ²	square millimeter	$= 10^{-6}$ m ²
cm ²	square centimeter	$= 10^{-4}$ m ²
dm ²	square decimeter	$= 10^{-2}$ m ²
a	are	$= 10^2$ m ²
ha	hectare	$= 10^4$ m ²
km ²	square kilometer	$= 10^6$ m ²

VOLUME m ³ = cubic meter		
mm ³	cubic millimeter	$= 10^{-9}$ m ³
cm ³	cubic centimeter	$= 10^{-6}$ m ³
dm ³	cubic decimeter	$= 10^{-3}$ m ³
km ³	cubic kilometer	$= 10^9$ m ³
ds	decistere	$= 0.1$ s $= 10^{-1}$ m ³
s	stere	$= 1$ m ³
dkas	dekastere	$= 10$ s $= 10$ m ³

B. MODERN SYSTEMS

Abyssinia.—var.: current, ca.*

Length		Capacity, dry	
1 pic	$= 0.686$ m	1 wakea	$= \frac{1}{2}$
1 farsang	$= 5.07$ km	1 mocha	$= \frac{1}{6}$
1 berri	$= \frac{1}{3}$ farsang	1 madega	$= 0.44$ l
Mass		1 ardeb	$= 10$ or 24 madega
1 rottolo	$= 311$ g	Capacity, liquid	
Unit	Rottolo	1 kuba	$= 1.016$ l
1 drachm	$= \frac{1}{16}$	Egypten v. Egypt.	
1 derime	$= \frac{1}{16}$	Athiopien v. Ethiopia.	
		Algeria.—Since 1843 =	
		France. Older:	

Length

1 pic (dzera à torky) $= 0.640$ m
 1 pic (dzera à rabry) $= 0.480$ m

Unit	Pic
1 termin	$= \frac{1}{4}$
1 rebia	$= \frac{1}{4}$
1 nus	$= \frac{1}{4}$

Mass

1 ukkia $= 34.13$ g
 1 metical $= ca. 4.7$ g

Unit	Ukkia
1 rottolo à thary	$= 16$
1 rottolo à khadhary	$= 18$
1 rottolo à kebyr	$= 24$
1 cantar	$= 100$
	rottolo

Capacity, dry

1 caffiso $= 317.47$ l
 1 saah $= 58$ l
 1 tarri $= \frac{1}{6}$ caffiso

Capacity, liquid

1 khoul $= 16\frac{1}{2}$ l or 16 l

Allemagne v. Germany.

Anam.—var.: ch., current:*

Length

1 thuoc moe $= 0.425$ m
 1 thuoc de ruong $= 0.470$ m
 1 thuoc vai $= 0.644$ m

Unit	Thuoc
1 ly	$= 0.001$
1 phan	$= 0.01$
1 tat	$= 0.1$
1 tun }	$= 5$
1 ngu }	$= 5$
1 truong	$= 10$
1 suo	$= 15$
1 chai vai }	$= 30$
1 that }	$= 30$
1 mao	$= 150$
1 gon	$= 300$

Mass

1 dong $= 3.775$ g
 1 picul $= 60$ kg

Unit	Dong
1 hao	$= 0.001$
1 li	$= 0.01$
1 fan	$= 0.1$
1 luong	$= 10$
1 neu	$= 100$
1 can	$= 160$
1 yen	$= 1600$
1 binh	$= 8000$
1 ta	$= 16$ 000
1 quan	$= 18$ 000

Area

1 ngu² $= 4.5156$ m²

Unit	Ngu ²
1 thuoc	$= 6$
1 suo	$= 90$

* By an ordinance of 1872, units were defined in terms of metric.

Unit Ngu²

1 mau $= 900$
 1 quo $= 1800$

Capacity

1 hao or shita $= 28.26$ l
 1 tao $= 2$ hao

Angola.—m.c. 1910.

Arabia.—Provincial, current

Length

1 covid $= 0.482$ m
 1 guz $= 0.635$ m
 1 cassaba $= 3.84$ m
 1 farsakh $= 4.83$ km

Unit Farsakh

1 baryd $= 4$
 1 marhala $= 8$

Mass

1 maund $= 1350$ g
 1 ratl $= ca. 460$ g

Unit Maund

1 cofilas $= \frac{1}{10}$
 1 vakias $= \frac{1}{10}$
 1 tukeas $= \frac{1}{10}$
 1 farzil $= 10$
 1 farecella $= 10$
 1 bahar $= 150$
 1 bokard $= 150$

Capacity, dry

1 téman $= 85$ l

Unit Téman

1 mecmeda $= \frac{1}{10}$
 1 kella $= \frac{1}{10}$
 1 mec dema $= \frac{1}{10}$

Capacity, liquid

1 nusfiash $= 0.79$ l or
 $= 0.95$ l

Unit Nusfiash

1 vakia $= \frac{1}{10}$
 1 cuddy $= 4$
 1 zudda $= 8$

Argentine Republic.—m.c.

1887; m.o. 1863. Older,* provincial:

Length

1 vara $= 0.8666$ m

Unit Vara

1 linéa $= \frac{1}{16}$
 1 pulgada $= \frac{1}{16}$
 1 pié $= \frac{1}{16}$
 1 braza $= 2$
 1 cuadra $= 150$
 1 legua $= 6000$

Mass

1 libra† $= 459.4$ g
 Unit Libra

1 grano $= \frac{1}{16}$
 1 adarme $= \frac{1}{16}$
 1 onza $= \frac{1}{16}$

* National system derived from old Spanish. Units given are those of province of Buenos Aires.

† 1 libra de farmacia $= \frac{1}{2}$ libra $= 344.5$ g.

Unit	Libra
1 arroba	= 25
1 quintal	= 100
1 tonelada	= 2000
Area	
1 vara ²	= 0.75 m ²
Capacity, dry	
1 fanega	= 137.1977 l
Unit	Fanega
1 cuartilla	= $\frac{1}{4}$
1 tonelada	= 7.5
1 lastre	= 15

Capacity, liquid

1 frasco = 2.375 l

Unit Frasco

1 octava = $\frac{1}{8}$ 1 cuarta = $\frac{1}{4}$

1 barrel = 32

1 quarter = 48

1 pipa = 192

Austria.—m.c. 1876; m.o. 1873. Older:

Length

1 Fuss* = 0.316 08 m

1 Ell = 0.7792 m

Unit Fuss

1 Punkt = $\frac{1}{1728}$

1 Linie = $\frac{1}{144}$

1 Zoll = $\frac{1}{12}$

1 Klafter = 6

1 Meile = 24 000

Mass, (1) ordinary

1 Pfund = 560.01 g

Unit Pfund

1 Pfennig } = $5\frac{1}{2}$ 1 Denat } = $5\frac{1}{2}$ 1 Quentchen = $1\frac{1}{2}$ 1 Loth = $\frac{1}{32}$ 1 Unze = $\frac{1}{16}$ 1 Vierding = $\frac{1}{4}$ 1 Mark = $\frac{1}{2}$

1 Stein = 20

1 Zentner = 100

1 Saum = 275

1 Karch = 400

Mass, (2) for drugs

1 Pfund apoth. = $\frac{3}{4}$ Pfund

= 420.01 g

Unit Pfund apoth.

1 Gran = $5\frac{1}{16}$ g

1 Scrupel = $2\frac{1}{8}$ g

1 Drachme = $\frac{1}{6}$ g

1 Unze = $\frac{1}{2}$ g

Area

1 Joch = 1600 Klafter²

= 57.557 a

1 Metze = $\frac{1}{2}$ Joch

* Vienna.

Capacity, dry

1 Metze = 61.489 l

Unit Metze

1 Probmetze = $1\frac{1}{32}$ 1 Becher = $1\frac{1}{8}$ 1 Futtermassel = $\frac{1}{8}$ 1 Muthmassel = $\frac{1}{8}$ 1 Achtel = $\frac{1}{8}$ 1 Viertel = $\frac{1}{4}$

1 Muth = 30

Capacity, liquid

1 Mass = 1.4151 l

Unit Mass

1 Pfiff = $\frac{1}{4}$ 1 Seidel = $\frac{1}{4}$ 1 Halbe = $\frac{1}{2}$

1 Viertel = 10

1 Eimer = 40

1 Fass = 400

1 Dreiling = 1200

1 Fuder = 1280

Balearic Islands.—m. Spain.

Local:

Length

1 canna = 1.564 m

1 palmos = $\frac{1}{3}$ canna

Mass

1 rottolo = 408 g

Unit Rottolo

1 libra major = 3

1 cortá = 9

1 quartano = 9

1 arroba = 26

1 misura = 36

1 cantaro barbaresco = 100

1 cantaro = 104

1 cargo = 312

Capacity, dry

1 quartera = 71.97 l

Unit Quartera

1 barcella = $\frac{1}{8}$ 1 almude = $3\frac{1}{6}$

Capacity, liquid

1 quartin = 27.14 l

Unit Quartin

1 quarte = $\frac{1}{3}$ 1 quarta = $\frac{1}{6}$

Bavaria v. Germany.

Belgian Congo.—m.c. 1911.

Belgium.—m.c. 1820; at first with the names: aune = m, litron = l, livre = kg, once = hg, lood = dg, wigdje = g, Older:

Length

1 perche = 6.497 m

1 pied = $\frac{1}{2}$ perche

Mass

1 livre = 489.5 g

Unit Livre

1 loth = $\frac{1}{2}$ 1 once = $\frac{1}{8}$ 1 marc = $\frac{1}{2}$

1 stein = 8

1 quintal = 100

1 chariot = 165

1 balle = 200

1 schiffpfund = 300

1 charge = 400

Area

1 arpent = 400 perche²

= 130.6 a

Birmanie v. British India,

Rangoon.

Bolivia.—m.c. 1893; m.o.

1871. Older = Spain.

Brazil.—m.c. 1892 Older *

Length

1 pé = 0.33 m

Unit Pé

1 palmo = $\frac{1}{2}$ 1 vara = $3\frac{1}{2}$

1 passo geometrico = 5

1 braça = $6\frac{1}{2}$

1 legoa = 20 000

Mass

1 libra = 459.05 g

Unit Libra

1 onza = $\frac{1}{16}$ 1 marco = $\frac{1}{2}$

1 arroba† = 32

1 quintal = 128

1 tonelada = 1728

Area

1 tarafa = 30 to 40 a

1 alqueire = 242 or 484 a

Capacity

1 almude = 31.944 l

1 alqueire = 40 to 320 l

Unit Almude

1 canada = $\frac{1}{2}$

1 pipa = 15

1 tonel = 30

Britain, British v. Great

Britain.

British India.—m.o. 1920.

Current: British and local.

Local, ‡ provincial

Bombay.

Length

1 guz = 0.6858 m

Unit Guz

1 tassooos = $\frac{1}{4}$

* Those of Portugal, with notable

local differences

† 1 arroba metrica = 15 kg

‡ Local or national measures are

now defined by their equivalents in

British units

Unit Guz

1 bath } = 3

1 covid } = 3

1 cubit } = 3

Mass

1 seer = 317.5147 g

Unit Seer

1 tank = $\frac{1}{2}$ 1 pice } = $3\frac{1}{2}$ or $1\frac{1}{8}$

1 parah } = 40

1 maund = 800

Area

Unit Are

1 ground = 2.03

1 bighah = 24.68

1 kani = 30.75

1 cawnie = 54

1 chahar = 2962

Capacity

1 parah = 110.1 l

Unit Parah

1 tipree = $1\frac{1}{2}$ 1 seer = $6\frac{1}{4}$ 1 adoulie = $\frac{1}{8}$

1 candy = 8

1 garce = 80

CALCUTTA.

Length

1 guz* = 0.9144 m

Unit Guz

1 joab } = $1\frac{1}{4}$ 1 jow } = $1\frac{1}{4}$ 1 unglee = $\frac{1}{8}$ 1 moot = $\frac{1}{2}$ 1 span = $\frac{1}{2}$ 1 covid } = $\frac{1}{2}$ 1 haut } = $\frac{1}{2}$

1 danda = 2

1 miranga = 10

1 coss = 2000

Mass

1 seer = 933.04 g

Unit Seer

1 ruttee = $7\frac{1}{8}$ g1 masha = $9\frac{1}{16}$ g1 tolah } = $\frac{1}{8}$ 1 sicca } = $\frac{1}{8}$ 1 chittack = $\frac{1}{8}$ 1 pouah = $\frac{1}{4}$ 1 raik = $\frac{1}{4}$

1 pally } = 5

1 dhurra } = 5

1 maund (bazar) = 40

Area

1 guz² = 0.836126 m²Unit Guz²

1 chattack = 5

1 cottah = 80

1 bighah = 1600

1 tenab = 2500

* Old guz = 0.915 m.

British India.—Cont'd.

Capacity
1 pally = 5.0 to 5.5 l

Unit Pally

1 chattaek = $\frac{1}{80}$

1 khoonke = $\frac{1}{64}$

1 kunk = $\frac{1}{16}$

1 ruk = $\frac{1}{4}$

1 souly = 20

1 khuhoon = 320

CEYLON.

Length

1 covid = 0.461 m

Mass

1 candy } = 226.8 kg

1 bahar } = 226.8 kg

Capacity

1 ammonam = 203.4 l

Unit Ammonam

1 parrah = $\frac{1}{4}$

1 seer = $2\frac{1}{8}$ a

MADRAS.

Length

1 covid = 0.172 m

Mass

1 seer = 283.495 g

1 cufh = 1.230 447 mg

Unit Cufh

1 fanam = 80

1 pagoda = 2880

Unit Seer

1 pagoda = $\frac{1}{80}$

1 pollam } = $\frac{1}{8}$

1 varahan } = $\frac{1}{8}$

1 powe = $\frac{1}{4}$

1 vis = 5

1 maund = 40

1 candy = 800

Area

1 cawnie = 53.41 a

1 maoney = $2\frac{1}{4}$ cawnie

Capacity

1 puddy = 1.533 l

Unit Puddy

1 olluck = $\frac{1}{8}$

1 measure = 1

1 mureal = 8

1 parah = 40

1 garce = 3200

RANGOON.

Length

1 sandong = 0.5588 m

Unit Sandong

1 palgat = $\frac{1}{2}$

1 taim } = $\frac{1}{4}$

1 cubit } = $\frac{1}{4}$

1 lan = 4

1 bamboo } = 7

1 dha } = 7

1 oke thapal = 140

1 dain = 7000

Mass

1 tical = 16.32 g

Unit Tical

1 ruay = $\frac{1}{64}$

1 pai = $\frac{1}{16}$

1 moo = $\frac{1}{4}$

1 mat = $\frac{1}{4}$

1 cattie = 33 $\frac{1}{2}$

1 viss = 100

1 candy = 15 000

Capacity

1 byee = 0.505 l

Unit Byee

1 lamuny = $\frac{1}{8}$

1 zalay = $\frac{1}{4}$

1 zayoot = 2

1 sert = 4

1 kwai = 8

STRAITS SETTLEMENTS.

Mass

1 kati = 604.79 g

Unit Kati

1 tahl = $\frac{1}{16}$

1 pakul = 100

1 bhara = 300

1 koyan = 4000

Capacity

1 gantang* = 1.515 96 l

Unit Gantang

1 para = 10

1 koyan = 800

Bulgaria. m.e. 1892.

Burma. v. British India.

Cambodia. v. Indo-China.

Canada.—m.e. 1871. Cur-

rent = British,† French names

are:

Length

1 pouce = 1 inch

1 chaumon = 1 huk

1 pied = 1 foot

1 verge = 1 yard

1 perche = 1 rod, pole

1 chaume = 1 chaum†

Mass

1 livre = 1 pound av.

1 cent } = 1 hundred weight

1 quintal } = 1 hundred weight

1 tonneau = 1 short ton

Area

1 arpent = 34.196 a

Capacity

1 pinte = 1 quart

1 chopine = 1 pint

1 boisseau = 8 gallons

1 minot = 39.025 l

* Gantang = British gallon

† Old French measures have been

used, but only minot and arpent are

now in use.

‡ Gunther's.

Ceylon v. British India.

Chile.—m.e. 1848. Older
were from Spanish; legal values:

Length

1 bara = 0.836 m

Unit Bara

1 linea = $\frac{1}{4}$ z

1 pulgada = $\frac{1}{2}$ a

1 pié = $\frac{1}{3}$

1 cuadra = 150

1 legua = 5400

Mass

1 libra = 460.093 g

Unit Libra

1 granos = $6\frac{1}{2}$ a

1 adarme = $2\frac{1}{2}$ b

1 castellano = $1\frac{1}{2}$ o

1 onza = $\frac{1}{16}$ a

1 arroba = 25

1 quintale = 100

Area

1 bara² = 0.698 896 m²

Capacity, dry

1 almude = 8.083 l

1 fauega = 12 almude

Capacity, liquid

1 cuartillo = 1.111 l

1 arroba = 32 cuartillo

China.—m.e. 1903 with the

following names:

Length

kilometer = sin li

hectometer = sin ym

dekameter = sin tehung

meter = sin teh

decimeter = sin tshwen

centimeter = sin fen

millimeter = sin li

Area

hectare = sin khing

are = sin meou

centare = sin li

Capacity

kiloliter = sin ping

hectoliter = sin chi

dekaliter = sin teou

liter = sin cheng

deciliter = sin ho

centiliter = sin cho

milliliter = sin tshwo

Great diversity in national

system; since 1908, defined by

metric equivalents. (The or-

thography here employed is

arbitrary; there is diversity in

provincial pronunciation.)

Length

1 tchi = 0.32 m

Unit Tchi

1 hoé = 10⁻⁶

1 su = 10⁻⁶

Unit Tchi

1 hao = 10⁻⁴

1 li = 10⁻³

1 fen = 10⁻²

1 tsonen = 10⁻¹

1 pou = 5

1 tchang = 10

1 yin } = 100

1 van } = 100

1 fen = 120

1 kyo = 300

1 li = 1800

1 poü = 18 000

1 thsan = 144 000

1 tou = 450 000

Mass

1 liang = 37.301 g

Unit Liang

1 hao = 0.0001

1 li = 0.001

1 fen = 0.01

1 tsen = 0.1

1 km } = 16

1 tchun } = 16

1 kwan = 480

1 tan = 1600

1 shih = 1920

Area

1 meou = 6000 tchi²

1 ma = 614.4 m²

Unit Meou

1 hao = $1\frac{1}{2}$ o

1 pou² } = $2\frac{1}{4}$ o

1 kung } = $2\frac{1}{4}$ o

1 lyi = $1\frac{1}{2}$ o

1 fen = $\frac{1}{10}$

1 kish = $\frac{1}{10}$

1 king = 10

1 ching = 100

Volume

1 tchi³ = 32.768 dm³

1 ma } = 100 tchi³

1 fang } = 100 tchi³

Capacity

1 cheng = 1 035 44 l

Unit Cheng

1 quei = 0.0001

1 co = 0.001

1 chao = 0.01

1 yo = 0.5

1 khô = 0.1

1 to = 10

1 hou = 50

1 chei } = 100

1 sei } = 100

1 ping = 500

Capacity, liquid

Liquids are measured by

weight.

Chypre, Cipro. v. Cyprus.

Cochin-China. v. Indo-China.

Columbia.—m.e. 1854, but

following, derived from metric

system, are current:

Length	Capacity	Unit	Pott
1 vara = 0.8 m	1 bocoy = 136.27 l	1 merice* = 70.6 l	1 viertel = 8
Unit Vara	1 barrile = $\frac{1}{2}$ bocoy	1 koree } = 93.592 l	1 fod ² = 32
1 pulgada = $\frac{1}{32}$	Cyprus.—British system.	1 strych }	1 anker* = 40
1 cuarta = $\frac{1}{4}$	Accepted equivalents:	Denmark.—m.c. 1912; m.o.	1 ohm* = 160
1 cuadra = 100	Length	1910. Older:	1 oxhoft* = 240
1 legua = 6250	1 pie = 2 foot	Length	1 pipe* = 480
Mass	= 0.6096 m	1 fod = 0.313 857 m	1 fuder* = 960
1 libra = 500 g	Mass	Unit Fod	Deutschland v. Germany.
Unit Libra	1 oke } = 2.8 pound av	1 lime = $\frac{1}{4}$	Dutch East Indies.—Same as
1 onza = $\frac{1}{16}$	1 oke } = 1270.06 g	1 tomme = $\frac{1}{2}$	Netherlands. Old Dutch and
1 arroba = 25	1 moosa* = 50 700 g	1 ahn = 2	local measures are also used.
1 quintal = 100	Unit Oke	1 faon, faun = 6	Latter very variable; recently
1 saco = 125	1 drachme = $\frac{1}{16}$	1 ruthe = 10	they have been legally defined
1 carga = 250	1 rottolo = 0.44	1 mul = 24 000	by their metric equivalents.
1 tonelada = 2000	1 stone = 5	Mass	Current:
Area	1 kantar = 44	1 pund = 500 g	Length
1 vara ² = 0.64 m ²	1 kantar (Meppo) = 180	Unit Pund	1 depa = 1.70 m
1 fanegada = 10 000 vara ²	1 ton = 800	1 es = 0.15 2	Unit Depa
Cirénaïque v. Tripoli.	Area	1 ort = 5 $\frac{1}{2}$	1 basta = $\frac{1}{4}$
Congo, Belgian.—m.c. 1911.	1 donum = 1600 yard ²	1 quintin = 1 $\frac{3}{8}$	1 kilan = $\frac{1}{4}$
Costa Rica, Guatemala,	= 13.378 a	1 loth = $\frac{1}{2}$	Mass. (1) Ordinary
Honduras, Nicaragua, Salva-	1 seala = 1 donum	1 unze = $\frac{1}{16}$	Unit Pikol
dor.—m.c. 1912 by a joint con-	Capacity	1 mark = $\frac{1}{2}$	1 thail = 1000
vention; in partial use at earlier	1 oke = 1.278 55 l	1 bismerpund = 12	Unit Pikol
dates. Older (modified Span-	1 cass = 4.73 l	1 hispund = 16	1 catir } = 100
ish, English, and local):	1 kile† = 36 368 l	1 wog = 36	1 kaba } = 100
Length	1 medimno = 75.05 l	1 waag = 36	1 kuluck = 0.0725
1 vara = 0.8393 m (Costa Rica)	1 kartos = 4 oke	1 waag = 36	1 amut = 2
= 0.8359 m (Guatemala)	1 kouza = 8 oke	1 quintal = 100	1 small bahar = 3
= 0.8128 m (Honduras)	1 gonari = 128 oke	1 centner = 320	1 large bahar = 4 5
Unit Vara	Cyrenaica v. Tripoli.	1 skippund = 5200	1 timbang = 5
1 cuarta = $\frac{1}{4}$	Czechoslovakia.—m.c. 1876 ‡	1 skyplast = 0.1	1 kojang
1 tercia = $\frac{1}{3}$	Local:	1 quint = 0.01	(Batavin) = 1667.555 kg
1 mecate = 24	Length	1 ort = 0.01	1 kojang
Mass	1 latro = 1.917 m	1 kvint = 0.001	(Semarang) = 1729.316 kg
1 canja = 16 kg	Bohemia.	Area	1 kojang
1 fanega = 92 kg	1 stopa § = 0.296 m	1 tondelände = 55.162 a	(Socrabaya) = 1852.839 kg
1 carga = 161 kg	1 sah = 1.778 m	1 tonde = 283.69 a	Mass. (2) For precious metals
Area	1 mile = 7.003 km	Unit Tonde	1 thail = 54.090 g
1 manzana = 10 000 vara ²	Prague.	1 penge = 3 $\frac{1}{8}$	Unit Thail
= 6960.5 m ² (Costa	1 loket = 0.593 m	1 album = $\frac{1}{16}$	1 wang = $\frac{1}{8}$
Rica)	Moravia.	1 fjerdingar = 3 $\frac{1}{2}$	1 tali = $\frac{1}{16}$
= 6987.4 m ² (Gua-	1 stopa § = 0.284 m	1 skieppe = $\frac{1}{8}$	1 sockoe = $\frac{1}{8}$
temala)	1 loket = 0.594 m	1 pfug = 32	1 read = $\frac{1}{2}$
= 6987.4 m ² (Nica-	Silesia.	Capacity, dry	Mass. (3) For opium
ragua)	1 loket = 0.579 m	1 korntonde = 139.12 l	1 thail = 38.601 g
1 caballeria = 64 manzana	1 mile = 6.483 km	Unit Korntonde	Unit Thail
Capacity	Area	1 pott = 3 $\frac{1}{4}$	1 tji = 0.1
1 botella = 0.63 to 0.67 l	Bohemia.	1 achtel = $\frac{1}{4}$	1 tjembang Mata } = 0.001
1 cañuela = 16.6 l	1 merice = 19.99 a	1 viertel = 3 $\frac{1}{2}$	Unit Thail
Quartillo is very variable.	1 koree } = 28 78 a	1 skieppe } = $\frac{1}{8}$	Area
Cuba.—m.c. 1858, but others	1 strych }	1 ottingkar = $\frac{1}{4}$	1 bahoe } = 70.965 a
(old Spanish, American, and	1 mira }	1 fjerdingkar = 1 $\frac{1}{4}$	1 how = $\frac{1}{16}$
local) are current:	Unit Koree	1 last = 22	1 lieue ² † = 55.0632 km
Mass	1 jitro = 2	Capacity, liquid	Volume
1 tonelada = 1015.65 kg	1 lan = 60	1 pott = 0.9661 l	1 kojang = 1.976 362 m ³
1 tercio = 72.22 kg	Area	Unit Pott	1 toembak = 6.684 m ³
Area	• Moosa = hundredweight	1 paezel = $\frac{1}{2}$	Capacity, dry
1 caballeria	† Kile = bushel.	1 kande = 2	1 kojang = 2011.2679 l
Cubana = 1342.02 a	‡ Old Vienna (v. Austria) and some	1 stubchen = 4	1 pikol = 3 $\frac{1}{16}$ kojang
1 cordele = 3 $\frac{1}{4}$ caballeria	local measures were still in use when	• Moravian.	† Variable
	the state was established		‡ Geographic.
	§ Stopa = strevic.		

Dutch East Indies.—Cont'd.*Capacity, liquid*

(Legal equivalents)

Unit	Liter
1 takar*	= 25.770
1 kit*	= 15.159
1 koelak*	= 3 709
1 kan†	= 1.5751
1 mutsjet†	= 0.1516
1 pintje*	= 0.0758

Ecuador.—m.c. 1865, but the British and, more generally the old Spanish, measures are currently used.

Egypt.—m.o. 1873; m.c. in government use, 1891. Current:†

Length

1 diraa baladi	= 0.58 m
1 kassabah	= 3.55 m
Unit	Diraa
1 kirat	= $\frac{1}{24}$
1 abdat	= $\frac{1}{4}$
1 kadam	= $\frac{1}{2}$
1 pie	= 1
1 gasub	= 4
1 mil hachmi	= 1000
1 farsakh	= 3000

Mass

1 oke	= 1248 g
Unit	Oke
1 kirat	= $\frac{1}{100}$
1 dirhem	= $\frac{1}{100}$
1 miskal	= $\frac{1}{80}$
1 okieh	= 0.03
1 rotoli	= 0.36
1 kantar	= 36
1 helm	= 200

Area

1 feddan	= 42.008 a
Unit	Feddan
1 sahme	= $\frac{1}{16}$
1 kirat kamel	= $\frac{1}{24}$
1 feddan masri	= 1

Capacity

1 keddah	= 2.0625 l
Unit	Keddah
1 kirat	= $\frac{1}{2}$
1 khanoubah	= $\frac{1}{16}$
1 toumna	= $\frac{1}{8}$
1 robbah	= $\frac{1}{4}$
1 nisf keddah	= $\frac{1}{2}$
1 malouah	= 2
1 rob	} = 4
1 roubouh	
1 keila	= 8
1 ardeb	= 96
1 daribah	= 768

* For oil

† For various products

‡ In national system, units and their interrelations were very variable, but since 1891, have been defined by their metric equivalents.

England v. Great Britain.**Equateur v. Ecuador.****Eritrea.**—m.o. Local, provincial*Length*

1 cubi	= 0.32 m
1 emmet }	= 0.46 m
1 derah }	

Mass

1 rotolo	= 448 g
1 okia	= $\frac{1}{16}$ rotolo
1 gisla	= 163 kg

Capacity

1 messé = 1.50 l

Unit

1 cabaho	= 4
1 tanica	= 12
1 ghebeta	= 16
1 entelam	= 128

Espagne v. Spain**Estonia.**—Russian and local

Current:

Length

1 archine (Russian)	= 0.7112 m
1 elle (Livonian)	= 0.6096 m
Unit	Archine
1 elle (Kummar)	= 0.75
1 faden	= 3

Mass

1 pfund	= 430 g
Unit	Pfund
1 quent	= $\frac{1}{24}$
1 loth	= $\frac{1}{32}$
1 hespfund	= 20
1 centner	= 120
1 tonne	= 240
1 schiffspfund	= 400

Area

Reval	
1 lofstelle	= 18.55 a
1 tonland	= 51 627 a
Livonian	
1 lofstelle	= 37.1 a
1 tonland	= 51.94 a

Capacity

1 hulmit	= 11.48 l
Unit	Hulmit
1 lof (Reval)	= 3
1 lof (Livonian)	= 6
1 tonne (Livonian)	= 12

Etablissements des Détroits

v. British India.

Etats-Unis v. United States.**Ethiopia.**—var. Current*Length*

(Approximate only)

Unit	cm
1 tat	= 2.5
1 gat	= 8
1 sunzer	= 16
1 kend	= 49

Mass

1 kasm	= 3.90 g
1 meter	= 336 g
1 farasula*	= 13.478 kg
1 farasula†	= 16.85 kg
1 farasula‡	= 17.072 kg
Unit	Kasm
1 mutagalla	= 2
1 alada	= 4
1 wogiet	= 8

Capacity

1 menelik = 1 l (approximate)

Philippine v. Philippine.**Finland.**—m.c. 1892; m.o. 1887. Older (Russian and local):*Area*

1 tunnland = 46.54 a

Capacity

1 tunna	= 163.49 l
1 kannor	= $\frac{1}{8}$ tunna
1 ottingar	= 15.71 l
1 sextingkar	= $\frac{1}{2}$ ottingar

France.—m.c. 1794. Other legal units.*Length*

1 mille marin = 1852 m

Volume

1 tonneau de jauge	= 2.83 m ³
1 tonneau de mer	= 1.44 m ³

Old measures derived from the system of Charlemagne are:

Length

1 toise§	= 1.949 0365 m||
1 toise§	= 1.949 090 m¶
Unit	Toise
1 ligne	= $\frac{1}{64}$
1 pouce	= $\frac{1}{12}$
1 pied	= $\frac{1}{6}$
1 aune	= 0.6064
1 lieue	= 2280.3
1 mille marin	= 950.13
1 lieue marine	= 2850.4

Mass

1 livre** = 489.505 85 g

Unit

Unit	Livre
1 grain	= $\frac{1}{7000}$
1 scruple	= $\frac{1}{24}$
1 gros	} = $\frac{1}{16}$
1 drachme	
1 once	= $\frac{1}{8}$
1 marc ††	= $\frac{1}{2}$

* For ivory.

† For coffee.

‡ For rubber.

§ Toise de Perou at 16 25°C

|| Equivalent made legal in 1799

¶ By measurement, in 1887, by

J. R. Benoit

** One livre de Charlemagne =

367.128 g

††1 Marc de la Rochelle = 244.75 g

1 Marc de Limoges = 240.93 g

1 Marc de Tours = 237.87 g

1 Marc de Troyes et

Paris = 260.05 g

Unit

1 quintal = 100

1 millier = 1000

Unit

Unit Livre (Ch)

1 sol = $\frac{1}{20}$ 1 denier = $\frac{1}{240}$ 1 obole = $\frac{1}{480}$ 1 grain = $\frac{1}{7200}$ *Area*

1 pied² = 0.10552 m²

Unit Pied²

1 toise² = 36

1 perche de Paris = 324

1 perche des Eaux

et Forêts = 484

1 arpent de Paris = 32 400

1 arpent des Eaux

et Forêts = 48 400

Capacity, dry

1 boisseau = 1.862 78 l*

Unit

Unit Boisseau

1 litron = $\frac{1}{10}$ 1 quart = $\frac{1}{4}$

1 minot = 3

1 mine = 6

1 setier = 12

1 muid = 144

Capacity, liquid

1 muid = 274.239 l†

1 muid = 268.241 l†

1 pinte = 0.931 389 l‡

Unit

Unit Pinte

1 roquille = $\frac{1}{8}$ 1 posson = $\frac{1}{4}$ 1 demi-setier = $\frac{1}{2}$ 1 chopine = $\frac{1}{2}$

1 pot = 2

1 velte = 8

1 quarteau = 72

1 feuillette = 144

1 muid = 288

Francia, Isola di v. Mauritius.**Frankreich v. France.****Germany.**—m.c. 1872. Since

the beginning of the nineteenth century, the other units and their interrelations have been fairly definite, but before that there was great diversity.

Length: fundamental unit was f'uss (foot), its value, depending upon the state, varied from 0.280 to 0.320 m. The one most extensively used was the Rheinlandischer Fuss (Rhenish foot) = 0.313 857 m. *Mass:* fundamental unit was Pfund

* From 1 muid = 268.241 l by relation 144 boisseau = 1 muid (see Capacity, Liquid).

† Legal value.

‡ Derived from concrete standards

§ From 1 muid = 268.241 l by

relation 288 pinte = 1 muid.

(pound), its value generally varied little from 467 g; during transition period preceding 1872 the accepted equivalents were Pfund = 30 Loth = 300 Zeut = 3000 Korn; Centner = 100 Pfund. Older:

BAVARIA.	
Length	
1 Fuss	= 0.291 86 m
1 Elle	= 0.833 01 m
Unit	
1 Linie	= $\frac{1}{14}$
1 Zoll	= $\frac{1}{2}$
1 Ruthe	= 10
1 Chaussemeile	= 25 406

Mass	
1 Pfund	= 500 g
Unit	
1 Gran	= $\frac{1}{1000}$
1 Pfennig	= $\frac{1}{2}$
1 Quint	= $\frac{1}{10}$
1 Loth	= $\frac{1}{2}$
1 Unze	= $\frac{1}{2}$
1 Zentner	= 100

Area	
1 Morgen	= 34 072 a
1 Tagwerk	= 34 072 a
1 Juchert	= 400 Ruthe ²

Capacity, dry	
1 Metzen	= 37.0596 l
Unit	
1 Dreissiger	= $\frac{1}{3}$
1 Mässel	= $\frac{1}{4}$
1 Scheffel	= 6

Capacity, liquid	
1 Masskanne	= 1.069 03 l
Unit	
1 Zoll ³	= $\frac{1}{16}$
1 Eimer	= 60 or 64
1 Fass	= 1600

PRUSSIA.	
Length	
1 Fuss	= 0.313 857 m
Unit	
1 Linie	= $\frac{1}{14}$
1 Zoll	= $\frac{1}{2}$
1 Ruthe	= 12
1 Meile	= 24 000
1 Elle	= 25.5 Zoll

Mass	
1 Pfund	= 467.711 g
Unit	
1 Quentchen	= $\frac{1}{16}$
1 Loth	= $\frac{1}{2}$
1 Stein	= 22
1 Centner	= 110
1 Schiffspfund	= 330

Area	
1 Morgen	= 25.532 24 a
1 Morgen	= 180 Ruthe ²

Capacity, dry	
1 Metze	= 3.435 89 l
Unit	
1 Quart	= $\frac{1}{4}$
1 Zoll ³	= $\frac{1}{16}$
1 Scheffel	= 16

Capacity, liquid	
1 Quart	= 64 Zoll ³
1 Quart	= 1.145 03 l
Unit	
1 Anker	= 30
1 Eimer	= 60
1 Ohm	= 120
1 Oxhoft	= 180
1 Fuder	= 720

WÜRTTEMBERG.	
Length	
1 Fuss	= 0.286 49 m
Unit	
1 Linie	= 0.01
1 Zoll	= 0.1
1 Elle	= 2.144
1 Ruthe	= 10
1 Meile	= 26 000

Mass	
1 Pfund	= 467.728 g
1 Apotheker-Pfund	= 357 647 g
Unit	
1 Quentlein	= $\frac{1}{16}$
1 Loth	= $\frac{1}{2}$
1 Mark	= $\frac{1}{2}$
1 Zentner	= 104

Area	
1 Ruthe ²	= 8 207.66 m ²
1 Morgen	= 384 Ruthe ²
1 Juchart	= 576 Ruthe ²
1 Tagwerk	= 576 Ruthe ²

Capacity, dry	
1 Simri	= 942.125 Zoll ³
	= 22.1533 l
Unit	
1 Viertelein	= $\frac{1}{4}$
1 Erklein	= $\frac{1}{2}$
1 Vierling	= $\frac{1}{4}$
1 Scheffel	= 8

Capacity, liquid	
1 Maass	= 78.125 Zoll ³
	= 1.837 05 l
Unit	
1 Schoppe	= $\frac{1}{4}$
1 Imi	= 10
1 Eimer	= 160
1 Fuder	= 960

Gioppône v. Japan.
Great Britain, Irish Free State, and Northern Ireland.—m.o. 1864. Since 1898, the national measures are convertible to metric by the legally sanctioned factors given below. National fundamental units defined thus: *Length*: The yard is distance at 62°F between axes of two lines traced on gold plugs

set in a bronze bar preserved at the Standards Department of the Board of Trade. *Mass*: The pound avoirdupois is the mass of a certain platinum standard, similarly preserved. *Capacity*: The gallon is the volume of 10 pounds avoirdupois of pure water, as weighed in air against brass weights, the water and air being at the temperature of 62°F and the barometer at 30 inches. In official comparisons, the density of brass is taken as 8.143 g/cm³. Some of the units in the following tables are not in current use.

Length	
1 yard* (yd.)	= 0.914 3992 m
1 foot (ft.)	= $\frac{1}{3}$ yd.
	= 30.479 97 cm
1 inch (in.)	= $\frac{1}{36}$ yd.
	= 2.539 998 cm

Unit	
1 mil	= 0.001
1 point	= $\frac{1}{72}$
1 line	= $\frac{1}{24}$
1 barleycorn	= $\frac{1}{3}$
1 nail	= 2.25
1 palm	= 3
1 hand	= 4
1 span	= 9
1 quarter	= 12
1 foot	= 12
1 cubit	= 18
1 pace	= 30
1 yard	= 36
1 ell	= 45
Unit	
1 fathom	= 6
1 pole	= 16.5
1 rod (rd.)	= 16.5
1 perch	= 20
1 rope	= 66
1 chain†	= 66
1 skein	= 360
1 furlong	= 660
1 cable length	= 720
1 mile (statute)	= 5280
1 mile (nautical)	= 6080
1 knot	= 15 840
1 league	= 15 840

Mass	
1 pound avoirdupois (lb. av.)	= 453.592 45 g
	= 7 000 grain

1 grain (gr.) = 64.798 182 mg
 (Three systems: avoirdupois, troy, apothecary.)

* This is the present legal equivalent of the imperial yard; recent comparisons by the National Physical Laboratory show that the yard as defined by the Weights and Measures Act of 1878 = 0.914 3987 m.

† Gunther's chain, divided into 100 link.

Avoirdupois (av.) (General use)

Unit	Pound
1 dram (dm.)	= $\frac{1}{16}$
1 ounce (oz.)	= $\frac{1}{16}$
1 clove or customary stone	= 8
1 stone (legal)	= 14
1 quarter	= 28
1 cental	= 100
1 hundred-weight (cwt.)	= 112
1 wey	= 252*
1 load	= 2240

Troy (t.)

(For precious metals)

Unit	Grain
1 pennyweight (dwt.)	= 24
1 ounce (oz.)	= 480
1 pound (lb.)	= 5760

Apothecary (ap.)

(For dispensing drugs)

Unit	Grain
1 scruple (s.)	= 20
1 drachm (dr.)	= 60
1 ounce (oz.)	= 480
1 pound (lb.)	= 5760

Area

1 inch ² (sq. in.)	= 6.451 5808 cm ²
1 foot ² (sq. ft.)	= 929.0289 cm ²
1 yard ² (sq. yd.)	= 0.836 1259 m ²
1 acre (A.)	= 4046.849 m ²
Unit	
1 inch ²	= $\frac{1}{144}$
1 yard ²	= 9

Unit	
1 pole ² (sq. po.)	= 30.25
1 rod ²	= 30.25
1 perch ²	= 30.25
1 chain ² †	= 484
(ch.)	= 484

1 rood	= 1210
1 acre (A.)	= 4840

Unit	
1 mile ² (sq. mi.)	= 640

Volume

1 yard ³ (cu. yd.)	= 0.764 552 85 m ³
1 foot ³ (cu. ft.)	= 28 316.77 cm ³
1 inch ³ (cu. in.)	= 16.387 0253 cm ³

Unit	
1 inch ³	= $\frac{1}{1728}$
1 yard ³	= 27

* Variable
 † Gunther's chain.

Great Britain.—*Cont'd.*Unit Foot³

1 register

ton = 100

1 rod = 1000

Capacity, dry

1 gallon (gal.) = 4 545 9631 l

1 bushel (bu.) = 8 gallon

= 35 367 7018 l

Unit Gallon

1 quarter = $\frac{1}{2}$

1 peck = 2

1 bucket = 4

1 bushel = 8

1 firkin = 9

1 kilderkin = 18

1 barrel = 36

1 hogshend = 63

1 puncheon = 84

1 butt = 126

Unit Bushel

1 strike = 2

1 sack = 3

1 bag = 4

1 coomb = 4

1 quarter = 8

1 scum = 8

1 chaldron = 32*

1 wey = 40*

1 load = 40*

1 last = 80*

Capacity, liquid

1 gallon (gal.) = 4 545 9631 l

Unit Gallon

1 gill = $\frac{1}{16}$ 1 quarter = $\frac{1}{4}$ 1 noggin = $\frac{1}{8}$ 1 pint = $\frac{1}{2}$ 1 quart = $\frac{1}{4}$ 1 pottle = $\frac{1}{2}$ **Greece.** m.c. 1922; m.o. 1836. Older.*Length*

1 piki varies 0.610 to 0.670 m

1 pie = 1 piki

1 small piki of Constantinople = 0.648 m

1 large piki of Constantinople = 0.669 m

1 piki (massoviy) = 0.750 m

Mass

1 drammie = 3.2 g

1 livre (Venetian) = 450 g

1 mna = 1.5 kg

1 mine (royal) = 1.5 kg

1 oka† = 1 280 kg

1 oka = 1 250 to 1 333 kg

1 stater = 56.32 kg

1 talanton = 150 kg

Area

1 stemma = 10 a

* Variable.

† 0.85331 royal mine.

Capacity

1 oka = 1.333 to 1.340 l

1 baril = 74.236 l

Grossbritannien v. Great Britain.**Guam.**—Metric is compulsory**Guatemala** v. Costa Rica.**Guinea.** m.c. 1910. Older = Portugal, England, and local:*Length*

1 pik = 0.578 m

1 jacktan = 3 658 m

Mass

1 benda = 64.2 g

1 kantar = 977 kg

1 gammell = $\frac{1}{2}$ kantar

Unit Benda

1 key = $\frac{1}{18}$ 1 mediatbla = $\frac{1}{32}$ 1 agurage = $\frac{1}{16}$ 1 quinto = $\frac{3}{32}$ 1 piso = $\frac{1}{8}$ 1 uzun = $\frac{1}{8}$ 1 seron = $\frac{3}{16}$ 1 benda (offa) = $\frac{1}{2}$ **Haiti.** m.c. 1921. Older = British, old French, and Spanish; legal equivalents during transition period:*Length*

1 toise = 1 9488 m

1 aune = 1 188 m

Area

1 carreau = 1292.3 m

*Volume*1 baril = 0.1 m³1 corde = 3.84 m³1 toise = 8 m³**Holland** v. Netherlands.**Honduras** v. Costa Rica.**Hungary.**—m.c. 1876. Older = old Vienna:*Length*

1 mertfold = 8.3536 km

1 meile = 0.105 36 m

1 marok = 0.105 36 m

1 faust = 0.105 36 m

Area

1 hold = 43.16 a

1 joeh = 43.16 a

1 meile² = 6978 ha*Volume*

1 eimer = 54.30 l

1 halbe = $\frac{1}{2}$ eimer1 teze = $\frac{1}{4}$ eimer

1 metzen = 62.53 l

1 ako = 62.53 l

Iceland.—m.c. 1907. Older (analogous to Danish) were defined by their metric equivalents.*Length*

1 fet = 0.313 85 m

1 sjomila = 1855 m

Unit Fet

1 lina = $1\frac{1}{4}$ 1 þunlungur = $1\frac{1}{2}$

1 aln = 2

1 faðmur = 6

1 mila a landi = 24 000

Mass

1 pund = 0.5 kg

Unit Pund

1 mark = 2

1 fisk = 8

1 fierding = 40

1 hespur = 64

1 tunna smjors = 224

1 skipmund = 320

1 batt = 320

*Area*1 ferfaðmur = 3 546 m²1 fermila = 56.7383 km²

Unit Ferfaðmur

1 ferþunlungur = $5\frac{1}{8}$ 1 ferfet = $\frac{1}{16}$ 1 feraln = $\frac{1}{8}$

1 tundagslatta = 900

1 engjateigur = 1600

*Capacity*1 pottar = $2\frac{1}{2}$ fet³

= 0.9661 l

Unit Pottar

1 kornskeppa = 18

1 anker = 39

1 almann turma = 120

1 óltunna = 136

1 kornunna = 144

India v. British India; v. Indo-China.**Indies, East** v. British India;

v. Dutch East Indies.

Indo-China, British v. British India.**Indo-China, French:****COCHIN CHINA.**—m.c. 1911,

with the names:

Length

1 môit thuoc = 1 m

Mass

1 môit cân tây = 1 kg

1 môit đồng cân tây = 1 g

1 picul = 60 kg

Capacity

1 vuông môit bat tây = 1 l

1 vuông môit gia = 40 l

CAMBODIA.—m.c. 1914, with the names:*Length*

1 muoi mètre = 1 m

Mass

1 pram rôl = 1 kg

1 muoi gramme = 1 g

1 hocsep = 60 kg

Capacity

1 muoi litre = 1 l

1 sêsep litre = 40 l

Irish Free State v. Great Britain.**Islande** v. Iceland.**Italian colonies.**—Metric compulsory.**Italy.**—m.c. 1861; adopted in Milan as early as 1803, with the following names:*Length*

metro = m

palmo = dm

dito = cm

atomo = mm

Mass

libbra nuova = kg

oncia = hg

grosso = dkg

denar = g

grano = dg

Capacity

soma = hl

mma = dkl

punta = l

coppo = dl

Older, provincial:

Length

1 piede lipraido = 0.513 77 m

Unit Piede lip.

1 punto = $1\frac{1}{4}$ 1 oncia = $\frac{1}{2}$

1 canna = 4

1 trabucco = 6

1 mugho = 4333 $\frac{1}{3}$ *Mass*

1 libbra = 307 to 398 g

Unit Libbra

1 grano = $6\frac{1}{12}$ 1 denaro = $2\frac{1}{8}$ 1 ottavo = $\frac{1}{8}$ 1 oncia = $\frac{1}{2}$

1 rubbo = 25

1 cantaro = 150

Area

1 quadraio = 38 a

1 giornata = $1\frac{1}{10}$ giornata

1 tavola = 150

Capacity, dry

1 mine = varies 12 to 120 l

Capacity, liquid

1 barile da vino = 45.6 l

1 barile da olio = 33.4 l

Japan.—m.o. 1893. Before 1891, great diversity; since 1891, fundamental units defined by metric equivalents.

Length	
1 shaku*	$\approx \frac{1}{3}$ m $= 0.303\ 0303$ m
Unit Shaku	
1 shi	$= 10^{-2}$
1 mō	$= 10^{-4}$
1 rin	$= 10^{-3}$
1 bu	$= 10^{-2}$
1 sun	$= 10^{-1}$
1 yabiki	$= 2.5$
1 hiro	$= 5$
1 ken	$= 6$
1 jō	$= 10$
1 chō	$= 360$
1 ri†	$= 12\ 960$

Mass	
1 kwan	$\approx \frac{1}{3}$ kg $= 3.75$ kg

Unit Kwan	
1 shi	$= 10^{-1}$
1 mō	$\approx 10^{-2}$
1 rin	$= 10^{-3}$
1 fun	$= 10^{-4}$
1 candareen	$\approx 10^{-4}$
1 mommē	$\approx 10^{-3}$
1 niyo	$= 0.004$
1 hyaku-mē	≈ 0.10
1 kin	$= 0.16$
1 nishoku-ichi-mun	$= 7$
1 kiyak-kin	$= 16$
1 kaus hin-achi-da	$= 18$
1 komma-achi-da	$= 40$

Area (Land Measure)	
1 bu	$= 100$ $= 30\ 25$ m ² $= 3.305\ 785\ 12$ m ²

Unit Bu	
1 gō	$= 0.1$
1 tsubo	$= 1$
1 sō	$= 30$
1 tan	$= 300$
1 chō	$= 3000$
1 ri ²	$= 46\ 656$

Capacity	
1 shō	$= \frac{1}{33.3}$ l $= 1.803\ 9068$ l $= 64827$ bu ³

Unit Shō	
1 shaku	$= 10^{-2}$
1 gō	$= 10^{-1}$
1 to	$= 10$
1 koku	$= 100$

Canada v. Canada.

Kolumbien v. Columbia.

Kongo v. Congo.

* The old shaku (kuji-shaku) =

1.25 shaku is legal for fabrics

† One ri marin (kai-ri) = nautical ri

Kuba v. Cuba.

Latvia.—m.o. Russian and local measures since 1845. Old measures were those of Holland.

Length	
1 elle	$= 0.537$ m
1 quartier	$= \frac{1}{4}$ elle
1 meile	$= 7$ verste (Russian) $= 7.168$ km

Mass	
1 pfund	$= 419$ g

For secondary units, see Esthonia

Area	
1 kapp	$= 1.4864$ a

Unit Kapp	
-----------	--

1 pourvete	$= 25$
------------	--------

1 loofstelle	$= 35$
--------------	--------

1 tomstelle	$= 35$
-------------	--------

1 fuden	$= 4\ 077$ s
---------	--------------

Capacity	
1 stoof	$= 1\ 2752$ l

Unit Stoof	
------------	--

1 kanne	$= 2$
---------	-------

1 kulmet	$= 9$
----------	-------

1 ecker	$= 30$
---------	--------

1 poure	$= 54$
---------	--------

1 loof	$= 108$
--------	---------

1 tonne	$= 108$
---------	---------

Lettonie v. Latvia.

Luxemburg.—m.e. 1820. Previously used a local unit

1 malter	$= 191$ l
----------	-----------

Malacca.—

Length	
--------	--

1 asta	$= 0.457$ m
--------	-------------

1 depa	$= 4$ asta
--------	------------

1 jumba	$= 8$ asta
---------	------------

Mass	
------	--

1 catty	$= 0.61$ kg
---------	-------------

Unit Catty	
------------	--

1 miam	$= \frac{1}{3}$ g
--------	-------------------

1 buncal	$= \frac{1}{2}$ g
----------	-------------------

1 tampang	$= 1$
-----------	-------

1 bedur	$= 2$
---------	-------

1 kip	$= 15$
-------	--------

1 pecul	$= 100$
---------	---------

1 bahar	$= 300$
---------	---------

Area	
------	--

1 jumba ²	$= 13.38$ m ²
----------------------	--------------------------

1 orlong	$= 400$ jumba ²
----------	----------------------------

1 orlong	$= 53\ 52$ a
----------	--------------

Capacity	
----------	--

1 chupa	$= ca. 1$ l
---------	-------------

1 gantang	$= 4$ chupa
-----------	-------------

Malaysia v. British India; v.

Dutch East Indies.

Malta.—m.e. 1914. Older,

British and local (old Sicilian):

Length

1 foot	$= 0.2836$ m
--------	--------------

1 canna	$= 2.088$ m
---------	-------------

1 palmo	$= \frac{1}{4}$ canna
---------	-----------------------

Mass

1 rottolo	$= 1.75$ lb. av.
-----------	------------------

	$= 0.793\ 79$ kg
--	------------------

Unit Rottolo	
--------------	--

1 parto	$= \frac{1}{4}$ g
---------	-------------------

1 ounce	$= \frac{1}{3}$ g
---------	-------------------

1 cantaro	$= 100$
-----------	---------

Capacity

1 caffiso	$= 20\ 457$ l
-----------	---------------

1 barni	$= 43.162$ l
---------	--------------

1 salina	$= 290.944$ l
----------	---------------

Marokko v. Morocco	
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Mauritius and Seychelles

Islands. m.e. Older = old

French, British, and the follow-

ing:

Capacity

1 cask	$= 227.11$ l
--------	--------------

1 velt	$= \frac{1}{3}$ cask
--------	----------------------

Mexico. m.e. 1806; m.o.	
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1857. Older (from Spanish,

Castilian), legally defined, dur-

ing transition period, in terms

of metric equivalents:

Length

1 vara	$= 0.838$ m
--------	-------------

Unit Vara	
-----------	--

1 linea	$= \frac{1}{32}$
---------	------------------

1 pulgada	$= \frac{1}{8}$
-----------	-----------------

1 pie	$= \frac{1}{3}$
-------	-----------------

1 legua	$= 5000$
---------	----------

Mass

1 libra	$= 160\ 246\ 34$ g
---------	--------------------

Unit Libra	
------------	--

1 tomin	$= \frac{1}{4}$ g
---------	-------------------

1 adarme	$= \frac{1}{2}$ g
----------	-------------------

1 ochava	$= \frac{1}{8}$ g
----------	-------------------

1 onza	$= \frac{1}{16}$ g
--------	--------------------

1 arroba	$= 25$
----------	--------

1 quintal	$= 100$
-----------	---------

1 tercio	$= 160$
----------	---------

Area

1 fanega	$= 356\ 628$ a
----------	----------------

Unit Fanega	
-------------	--

1 caballeria	$= 12$
--------------	--------

1 labor	$= 18$
---------	--------

1 sitio	$= 492\ 28$
---------	-------------

Capacity, dry

1 cuartillo	$= 1.8918$ l
-------------	--------------

Unit Cuartillo	
----------------	--

1 almud	$= 4$
---------	-------

1 fanega	$= 48$
----------	--------

1 carga	$= 96$
---------	--------

Capacity, liquid

1 cuartillo	$= 0.456\ 264$ l
-------------	------------------

1 cuartillo for	$= 0.506\ 162$ l
-----------------	------------------

oil	$= 18$ cuartillos
-----	-------------------

1 jarra	$= 18$ cuartillos
---------	-------------------

Morocco.—m.o.; local, var.:

Length

1 cubit	$= 0.533$ m
---------	-------------

1 canna	$= 0.61$ m
---------	------------

1 pie	$= \frac{1}{4}$ pie
-------	---------------------

1 tonni	$= \frac{1}{4}$ pie
---------	---------------------

Mass

1 rotal	$= 507.5$ g
---------	-------------

1 artal	$= 3$ kg
---------	----------

1 gerbe	$= 22$ rotal
---------	--------------

1 kula	$= 100$ rotal
--------	---------------

1 kantar	$= 100$ rotal
----------	---------------

Capacity

1 sahh	$= 56$ l
--------	----------

1 fanega	$= 14$ l
----------	----------

1 mudd	$= 14$ l
--------	----------

1 alnude	$= 14$ l
----------	----------

Mozambique v. Portuguese

East Africa.

Netherlands.—m.e. 1820,

with the names:

Length

strep	$=$ mm
-------	--------

dun	$=$ cm
-----	--------

palm	$=$ dm
------	--------

elle	$=$ m
------	-------

roede	$=$ dkm
-------	---------

myle	$=$ km
------	--------

Mass

korrel	$=$ dg
--------	--------

wigtje	$=$ g
--------	-------

lood	$=$ dkg
------	---------

once	$=$ hg
------	--------

pond	$=$ kg
------	--------

Capacity, dry

mantje	$=$ dl
--------	--------

kop	$=$ l
-----	-------

schepel	$=$ dkl
---------	---------

mudde	$=$ hl
-------	--------

zak	$=$ hl
-----	--------

last	$=$ 30 hl
------	-----------

Capacity, liquid

vingerhoed	$=$ cl
------------	--------

mantje	$=$ dl
--------	--------

kun	$=$ l
-----	-------

dekaliter	$=$ dkl
-----------	---------

vat	$=$ hl
-----	--------

Old national system is more

or less current in some of the

old colonies:

Length

(Amsterdam)

1 roeden	$= 3.679\ 77$ m
----------	-----------------

1 elle	$= 0.687\ 813$ m
--------	------------------

Netherlands.—*Cont'd.*

1 pond (Apothecary)
= $\frac{1}{4}$ pond
= 369.126 g

Unit	Pond
1 mark	= $\frac{1}{2}$
1 unze	= $\frac{1}{16}$
1 drachme	= $\frac{1}{16}$
1 engel	= $\frac{1}{32}$
1 vierling	= $\frac{1}{64}$
1 grein	= $\frac{1}{128}$

Area

1 morgen = 81.244 346 a

Capacity, dry

1 schepel = 27.26 l

Unit	Schepel
1 kop	= $\frac{1}{8}$
1 vierd	= $\frac{1}{4}$
1 zak	= 3
1 mud	= 4
1 last	= 108

Capacity, liquid

1 mingelen = 1.200 to 1.237 l

Unit	Mingelen
1 vat	= 768
1 oxhooff	= 192
1 aan	= 128
1 anker	= 32
1 steekan	= 16
1 stoop	= 2
1 pint	= $\frac{1}{2}$
1 mutsje	= $\frac{1}{8}$

Nicaragua v. Costa Rica.

Niederlande v. Netherlands.

Northern Ireland v. Great Britain.

Norway.—m.c. 1882; m.o. 1879. Older differed very little from Danish; legal equivalents:

Length

1 fod = 0.3137 m

Mass

1 skaalpund = 0.4981 kg

Area

1 mal = 10 a

Capacity, dry

1 korntonde = 138.97 l

Capacity, liquid

1 pot = 0.9651 l

Oceania.—British measures.

Olanda v. Netherlands.

Österreich v. Austria.

Países Bajos v. Netherlands

Panama.—Metric compulsory.

Paraguay.—Metric almost exclusively used. m.o. 1899. Older = Spain; legal equivalents:

Length

1 vara (old)	= 0.838 56 m
1 cuerda	= 83 $\frac{1}{2}$ vara = 69.88 m
1 cordel	= 83 $\frac{1}{2}$ vara = 69.88 m
1 vara	= 0.866 m
Unit	Vara
1 piede	= $\frac{1}{4}$
1 ponce	= $\frac{1}{8}$
1 ligne	= $\frac{1}{16}$
1 cuadra	= 100
1 lieue	= 5000

Mass

1 libra (old)	= 460.08 g
1 libra	= 459 g
Unit	Libra
1 once	= $\frac{1}{16}$
1 arroba	= 25
1 quintal	= 100
1 tonne	= 2000

Area

1 liño (old)	= 48.832 a
1 liño	= 100 vara ²
1 hño	= 75 m ²

Capacity, dry

1 fanega	= 288 l
1 almude	= $\frac{1}{2}$ fanega

Capacity, liquid

1 frasco	= 3.029 l
Unit	Frasco
1 cuarta	= $\frac{1}{4}$
1 barrel	= 32
1 pipe	= 192

Pays-Bas v. Netherlands.

Persia.—Metric is in process of adoption. By 1924 the following assimilation had occurred: 1 zar = 1 m, 1 dram = 1 g, 1 ralte = 1 l. National measures, provincial, var.; even today, in retail commerce, cereal grains are used as weights:

Length

1 guerze (common)	= 0.63 to 0.97 m
	= 1 monk-elzer
1 zar	= 1.04 m
Unit	Zar
1 gireh	= $\frac{1}{16}$
1 ouroub	= $\frac{1}{8}$
1 charac	= $\frac{1}{4}$
1 gez	= 1
1 guerze	= 1
1 farsakh	= 6000
1 parasang	= 6000

Mass

1 miskal	= 4.60 g
Unit	Miskal
1 una	= $\frac{1}{16}$
1 gandum	= $\frac{1}{8}$
1 grain	= $\frac{1}{16}$
1 abbas	= $\frac{1}{32}$

*Unit**Miskal*

1 nakhod	= $\frac{1}{4}$
1 carat	= $\frac{1}{4}$
1 dung	= $\frac{1}{2}$
1 dartung	= 0.22
1 dirhem	= 2
1 sir	= 16
1 pinar	= 20
1 danar	= 40
1 abbassi	= 80
1 rottel	= 100
1 teheirek	= 160
1 saddirham	= 320
1 batman (Tauris)	= 640
1 batman (Shirez)	= 1280
1 butman	= 600 to 1000
1 karvar	= 100 batman

Area

1 jerih	= 1082 m ² to 1153 m ²
	= 1000 to 1066 zar ²

Capacity

1 chenica	= 1.32 l
Unit	Chenica
1 sextario	= 0.25
1 capichas	= 2
1 sabblitha	= 5.5
1 colluthun	= 6.25
1 legana	= 30
1 artaba	= 50

Peru.—m.c. 1869. Older (from Spanish, Castilian):

Length

1 vara = 0.835 98 m

Mass

1 libra	= 460.09 g
Unit	Libra
1 arroba	= 25
1 quintal	= 100
1 fanega	= 140

Area

1 topo	= 27.06 a
1 fanegada	= 64.596 a

Philippine Islands.—m.c. 1860. Older = Spain. Local:

Mass

1 catty	= about 600 g
Unit	Catty
1 punto	= $\frac{1}{4}$
1 chinanta	= 10
1 lachsa	= 48
1 caban	= 97
1 pecul	= 100

Area

1 balita	= 27.95 a
Unit	Balita
1 loan	= 0.1
1 quignon	= 10

Capacity

1 kaban	= 99.90 l
1 chupa	= 3.75 cm ³
1 ganta	= $\frac{1}{2}$ kaban
1 apatan	= $\frac{1}{4}$ chupa

Poland.—Metric in process of adoption; in some provinces it has been in use since 1872. Russian system legalized in 1849, without displacing national measurements. Since 1819 these have been defined by their metric equivalents.

National:

Length

1 stopa	= 0.288 m
Unit	Stopa
1 linja	= $\frac{1}{16}$
1 cal	= $\frac{1}{16}$
1 lokiec	= 2
1 sazen	= 6
1 pret	= 15

Old measures

1 pied (Warsaw)	= 0.2978 m
1 pied (Cracow)	= 0.3564 m
1 aune	= 0.620 m

Mass

1 funt	= 405.504 g
Unit	Funt
1 gran	= $\frac{1}{256}$
1 skrupul	= $\frac{1}{64}$
1 drachma	= $\frac{1}{16}$
1 lut	= $\frac{1}{8}$
1 uncja	= $\frac{1}{16}$
1 kamian	= 25
1 centnar	= 100

Old measures

1 funt	= 404 g
1 centner	= 16 funt
1 stein	= 3.2 funt

Area

1 pret ²	= 18.6624 m ²
1 morga	= 300 pret ²
1 wloka	= 9000 pret ²

Capacity

1 kwarta	= 1 l
Unit	Kwarta
1 kwarterka	= $\frac{1}{4}$
1 garniec	= 4
1 cwiere	= 32
1 korzec	= 128

Porto Rico.—m.c. 1860.

Older = Spain:

Area

1 cuerdo	= 2250 vara ²
	= 15.72 a

Portugal.—m.c. 1872; m.o. 1852. Older:*

Length

1 pe	= 0.3285 m
1 estadio	= 258 m
1 milha	= 8 estadio
1 legoa	= 24 estadio

* In some of the older colonies the old Portuguese system, more or less modified, is still in use.

Unit	Pe
1 linha	= $1\frac{1}{4}$
1 pollegada	= $1\frac{1}{4}$
1 palmo	= $\frac{3}{4}$
1 covada	= 2
1 vara	= $1\frac{1}{2}$

Mass

1 libra*	= 459 g
Unit	Libra
1 grao	= $9\frac{1}{2}$
1 escrupulo	= $3\frac{1}{4}$
1 outava	= $1\frac{1}{8}$
1 onca	= $1\frac{1}{8}$
1 marco	= 1
1 meio	= $\frac{1}{2}$
1 arratel	= 1
1 arroba	= 32
1 quintal	= 128

Area

1 vara ²	= 1.2 m ²
Unit	Vara ²
1 ferrado	= 605
1 geira	= 4840

Capacity, dry

1 fanga	= 54 l
Unit	Fanga
1 outava	= $\frac{1}{2}$
1 quarto	= $\frac{1}{4}$
1 meio	= $\frac{1}{2}$
1 alqueira	= $\frac{1}{4}$
1 moio	= 15

Capacity, liquid

1 almude	= 16.5 l
Unit	Almude
1 quartillo	= $\frac{1}{4}$
1 meio	= $\frac{1}{2}$
1 canada	= $\frac{1}{4}$
1 alqueira	= $\frac{1}{4}$
1 bota	= 26
1 pipa	= 26
1 tonelada	= 52

Portuguese Colonies.—Metric compulsory.

Portuguese East Africa (Mozambique).—m.c. 1910. Older, mainly of Portugal; one bahar is considered equivalent to 109 kg.

Prussia v. Germany.

Rumania.—m.c. 1884; m.o. 1866. In old Bessarabia, Russian measures replaced by metric in 1922. Older:

Length

1 halibiu	= 0.701 m
1 endere	= 0.662 m
1 stringene	= 1.96 m

Mass

1 cantar	= ca. 56 kg
1 oke	= $\frac{1}{4}$ cantar

*For drugs 1 libra = 1 libra = 344.25 g.

Capacity
1 dimerla = 24.6 l

Unit	Dimerla
1 oke	= $1\frac{1}{2}$
1 mirze	= 8
1 kilo	= 16

Capacity, liquid

1 viacka	= 14.15 l
1 oke	= 0.1 viacka

Russia.—m.o. 1900. Definitions of fundamental national units: *Length* Archine is distance at 17°C between the axes of two lines drawn on the platinum-iridium prototype marked "H 1894". *Mass* Fount is mass of the platinum-iridium prototype marked "H 1894". *Capacity, liquid* Vedro is volume of 30 founts of pure water at 16°C. *Capacity, dry* Garnetz is $\frac{1}{15}$ vedro.

Length

1 archine	= 0.711 200 m
1 totchka	= 0.254 0000 mm

Unit	Totchka
1 ligne	= 10
1 paletz	= 50
1 sotka	= 84
1 dume	= 100
1 verchoc	= 175
1 foute	= 1200
1 archine	= 2800

Unit	Archine
1 sagène	= 3
1 verste	= 1500

Mass (1) Ordinary

1 fount	= 409.51241 g
1 doli	= 44.434 9403 mg

Unit	Doli
1 sol	= 96
1 zolotnik	= 96
1 lote	= 288
1 once	= 576
1 lana	= 768
1 fount	= 9216
Unit	Fount
1 poud	= 40
1 berkovets	= 400
1 tonne marine	= 2400

Mass (2) For drugs

Unit	Doli
1 grain	= 1.4
1 scrupule	= 28
1 drachme	= 84
1 once	= 672
1 livre	= 8064

Area

1 archine ²	= 0.505 8054 m ²
1 ligne ²	= 6.451 600 mm ²

Ligne³

1 dufme ³	= 100
1 verchoc ³	= 306.25
1 foute ³	= 14 400
1 archine ³	= 78 400

Unit	Archine ³
1 sagène ³	= 9
1 décatine	= 21 600
1 verste ³	= 2 250 000

Volume

1 archine ³	= 0.359 7288 m ³
1 ligne ³	= 16.387 06 mm ³

Unit	Ligne ³
1 dufme ³	= 1000
1 verchoc ³	= 5359.375
1 foute ³	= 1 728 000
1 archine ³	= 21 952 000
Unit	Archine ³
1 sagène ³	= 27
1 tonne marine	= 7 871 72
1 last marin	= 15.743 44

Capacity, dry

1 garnetz	= 3.279 842 l
1 tehast	= 0.109 328 07 l

Unit	Tehast
1 polougarnetz	= 15
1 garnetz	= 30
1 lof	= 592

Unit	Garnetz
1 tehctverik	= 8
1 polouosmina	= 16
1 osminn	= 32
1 tehctvert	= 64

Capacity, liquid

1 vedro	= 12.209 41 l
1 teharka	= 0.122 9941 l

Unit	Teharka
1 ehkalik	= 0.5
1 bottle (vodka)	= 5
1 bottle (wine)	= 6.25
1 krouchka	= 10
1 shloff	= 12.5
1 vedro	= 100
Unit	Vedro
1 stekar	= 1.5
1 anker	= 3
1 pipe	= 36
1 fass	= 40
1 botchka	= 40

Salvador v. Costa Rica.

Schottland v. Great Britain.

Schweden v. Sweden.

Schweiz v. Switzerland.

Scotland, Scozia v. Great Britain.

Serbie-Croatie-Slovénie v. Yugoslavia.

Seychelles Islands v. Mauritius.

Siam.—m.c. 1923; m.o. 1889. Older now defined by metric equivalents; those of transition period:

Length

1 wah	= 2 m
Unit	Wah
1 anukabiet	= $7\frac{1}{8}$
1 kabiet	= $8\frac{1}{4}$
1 niou	= $9\frac{1}{2}$
1 keup	= $\frac{1}{8}$
1 sawk	= $\frac{1}{4}$
1 sock	= $\frac{1}{2}$
1 ken	= $\frac{1}{2}$
1 sen	= 20
1 roemeng	= 2000
1 yote	= 8000

Mass

1 tchang*	= 1200 g
Unit	Tchang
1 klom	= $1\frac{1}{2}$
1 klum	= $5\frac{1}{2}$
1 pai	= $5\frac{1}{2}$
1 sompay	= $1\frac{1}{2}$
1 grani	= $1\frac{1}{2}$
1 fuang	= $6\frac{1}{2}$
1 salung	= $5\frac{1}{2}$
1 buht	= $5\frac{1}{2}$
1 tamlung	= $5\frac{1}{2}$
1 doon	= 20
1 hap	= 50
1 bara	= 400

Area

1 wah ²	= 4 m ²
1 ngan	= 100 wah ²
1 rai	= 400 wah ²

Capacity

1 tunan†	= 1 l
Unit	Tunan
1 niou	= $1\frac{1}{2}$
1 chai meu	= $\frac{1}{2}$
1 kum meu	= $\frac{1}{2}$
1 laang	= $\frac{1}{2}$
1 chang awn	= $\frac{1}{2}$
1 kanahn	= 1
1 sut	= 20
1 tang	= 40
1 tamlaum	= 400
1 seste	= 800
1 ban	= 1600
1 kwien	= 2000 or 3200
1 koyan	= 32 000
1 cohi	= 32 000

Siria v. Syria.

Somaliland.—m.o.; local, vary with material and province:

Length

1 top	= 3.92 m
1 cubito	= $\frac{1}{2}$ top

Mass

1 rottolo	= 448 g
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*Previously, 1 tchang = 660 to 1300 g.

†Previously, 1 tunan = 0.9 to 1.2 liter.

Somaliland.—*Cont'd.*

Unit	Rottolo
1 okia	= $\frac{1}{8}$
1 frasila	= 36
1 gisla	= 360

Area
1 darat = 80 a

Capacity, dry

1 chela = 1.359 l

Unit Chela

1 tabla = 15

1 gisla = 120

Capacity, liquid

1 caba = 0.453 l

Soudan *v.* Sudan.

South Africa *v.* Union of South Africa

Spain.—m.c. 1860. Older,* var., provincial; Castilian:

Length

1 vara = 0.835 905 m

(Other vara comprised between 0.768 m and 0.912 m)

Unit	Vara
1 punto	= $\frac{1}{12}$
1 linea	= $\frac{1}{12}$
1 dedo	= $\frac{1}{4}$
1 pulgada	= $\frac{1}{8}$
1 sesma	= $\frac{1}{6}$
1 palma	= $\frac{1}{4}$
1 pie	= $\frac{1}{3}$
1 codos	= $\frac{1}{2}$
1 paso	= $\frac{1}{2}$
1 estado	= 2
1 estadal	= 4
1 milla †	= 1666 $\frac{2}{3}$
1 legua	= 5000 or 8000

Mass

1 libra = 0.460 093 g

(Other libra comprised between 350 g and 575 g)

Unit	Libra
1 grano	= $\frac{1}{9}$
1 arienzo	= $\frac{1}{3}$
1 tomin	= $\frac{1}{3}$
1 dinero	= $\frac{1}{4}$
1 adarme	= $\frac{1}{5}$
1 drama	= $\frac{1}{5}$
1 ochava	= $\frac{1}{8}$
1 character	= $\frac{1}{8}$
1 escrupulo	= $\frac{1}{12}$
1 onza	= $\frac{1}{16}$
1 marco	= $\frac{1}{2}$
1 arroba	= 25
1 barril	= 50
1 quintal	= 100
1 quintalmacho	= 150
1 tonelada	= 2000

* Old national system, more or less modified, is still in use in the old Spanish colonies.

† Milla = 5000 pte.

Area

1 vara² = 0.698 7372 m²

Unit Vara²

1 cuartilla	= 25
1 calemín	= 768
1 aranzada	= 6400
1 fanega	= 9216
1 fanegada	= 9216
1 yugada	= 460 800

Capacity, dry

1 fanega = 55.501 l

Unit Fanega

1 ochavillo	= $\frac{1}{8}$
1 ración	= $\frac{1}{2}$
1 cuartillo	= $\frac{1}{4}$
1 medio	= $\frac{1}{2}$
1 calemín	= $\frac{1}{2}$
1 almuñe	= $\frac{1}{2}$
1 cuartilla	= $\frac{1}{2}$
1 cahiz	= 12

Capacity, liquid

(Arroba was defined as volume of 34 libra of river water. The arroba for oil was volume of 25 libra of oil)

1 arroba (wine) = 16.133 l

1 arroba (oil) = 12.563 l

Unit Arroba

1 copas	= $\frac{1}{8}$
1 quarterone	= $\frac{1}{8}$
1 panilla*	= $\frac{1}{8}$
1 libra	= $\frac{1}{8}$
1 cuartillo	= $\frac{1}{4}$
1 azumbre	= $\frac{1}{4}$
1 cuatilla*	= $\frac{1}{4}$
1 cantara	= 1
1 moio	= 16
1 pipa	= 27
1 bota	= 30

Stati Uniti *v.* United States.
Straits Settlements *v.* British India.

Sud-Africaine, Union *v.* Union of South Africa.

Sudan. Egyptian in use.

Suède *v.* Sweden.

Suisse *v.* Switzerland.

Svezia *v.* Sweden.

Svizzera *v.* Switzerland.

Sweden. m.c. 1889; m.o.

1879. Older:

Length

1 fot = 0.296 90 m

Unit Fot†

1 lme	= $\frac{1}{4}$
1 tun	= $\frac{1}{2}$
1 alm	= 2
1 famn	= 6
1 stang	= 16
1 ref	= 100 or 160
1 mil	= 18 000

* Old
† The fot is also divided into deelmals.

Mass

1 skålpund = 425.076 g

Unit Skålpund

1 as	= $\frac{1}{8}$
1 quintin	= $\frac{1}{8}$
1 lod	= $\frac{1}{2}$
1 untz	= $\frac{1}{8}$
1 lispund	= 20
1 sten	= 32
1 centner	= 100 or 120
1 waag	= 165
1 skeppund	= 400
1 nylist	= 12 000

Area

1 fot² = 0.088 149 61 m²

1 kappland { = 1.542 618 17 a

= 1750 fot²

1 ref² = 8.814 961 a

1 tunland { = 49.363 781 6 a

= 56 000 fot²

Capacity, dry

1 kanna = 2.617 l

Unit Kanna

1 ort	= $\frac{1}{2}$
1 junkfra	= $\frac{1}{2}$
1 quarter	= $\frac{1}{4}$
1 stop	= $\frac{1}{2}$
1 kappar	= $\frac{1}{4}$
1 fjerdingar	= 7
1 spanna	= 28
1 tunna	= 56
1 koltunna	= 63
1 kollast	= 756

Capacity, liquid

1 kanna = 0.1 fot³

= 2.617 162 l

Unit Kanna

1 jungfrur	= $\frac{1}{4}$
1 jungfer	= $\frac{1}{4}$
1 quarter	= $\frac{1}{4}$
1 stop	= $\frac{1}{2}$
1 ankar	= 15
1 eimer	= 30
1 am	= 60
1 ohm	= 60
1 oxhufud	= 90
1 oxhoft	= 90
1 pipe	= 180
1 fuder	= 360

Switzerland.—m.c. 1877;

m.o. 1868. Older, var.; during transition were fixed as follows:

Length

1 pied } = 30 cm

1 fuss }

Unit Pied

1 ligne } = $\frac{1}{4}$

1 linie }

1 pouce } = $\frac{1}{2}$

1 zoll }

1 aune } = 2

1 elle }

1 toise } = 6

1 ruthe }

Unit Pied

1 perche = 16

1 lieue = 16 000

Mass (1) Ordinary

1 livre = 500 g

Unit Livre

1 loth = $\frac{1}{8}$

1 once = $\frac{1}{8}$

Mass (2) For medicine

1 livre = 375 g

Unit Livre

1 grain = $\frac{1}{8}$

1 scruple = $\frac{1}{8}$

1 drachme = $\frac{1}{8}$

1 once = $\frac{1}{2}$

Syria.—m.o.; current:

Length

1 pic = 0.582 m

Mass

1 rottolo = 1785 g

Unit Rottolo

1 drachme } = $\frac{1}{8}$

1 pesi }

1 metecali = $\frac{1}{8}$

1 mitcal = $\frac{1}{8}$

1 once = $\frac{1}{8}$

1 zurbo = 27.5

1 cola = 35

1 cantar = 100

Capacity

1 rotl = 3.2 l

Unit Rotl

1 makuk = 250

1 garava = 450

Tchéco-Slovaquie *v.* Czechoslovakia.

Tonkin.—Same as Anam (*q.v.*)

Tripoli and Cyrenaica.—m.o., current defined by metric equivalents:

Length

1 pik = 0.68 m

= 1 handaze

1 palmo = $\frac{1}{3}$ pik

1 draa = 0.46 m

Mass

1 rottolo = 512.8 g

1 oka { = 2.5 rottolo

= 1282 g

1 metical = 4.76 g

Unit Rottolo

1 kharouba = $\frac{1}{8}$

1 dram = $\frac{1}{8}$

1 termino = $\frac{1}{8}$

1 uekin = $\frac{1}{8}$

1 mattaro = 42

1 cantar = 100

Area

1 pik² = 0.4624 m²

	Pik*	Length		Length		Area
denum = 1600		1 archine = 64 to 76 cm		1 yard (yd.) = $\frac{3}{4}$ m		1 inch ² (sq. in.) = 6.451 6288 cm ²
jabia = 1800		1 archine (for architecture) = 75.77 cm		= 0.914 401 83 m		1 foot ² (sq. ft.) = 929.0341 cm ²
Capacity, dry				1 foot (ft.) = $\frac{1}{3}$ yd.		1 yard ² (sq. yd.) = 0.836 130 71 m ²
orba = 7.6 l		Unit Archine		1 inch (in.) = $\frac{1}{36}$ yd.		1 acre (A.) = 4046.873 m ²
Unit Orba		1 noektat = $3\frac{1}{8}$		= 2.540 005 08 cm		
nufsoerah = $\frac{1}{2}$		1 hatt = $2\frac{1}{8}$		Unit Inch		Unit Foot ²
temen = 4		1 parnack = $\frac{3}{4}$		1 mil = 0.001		1 inch ² = $\frac{1}{144}$
ueba = 16		1 ouromb = $\frac{1}{4}$		1 hand = 4		1 yard ² = 9
(Measured by weight)		1 pic = 1		1 span = 9		Unit Yard ²
1 oka = 1282 g		Mass		1 foot = 12		1 rod ² (sq. rd.) = 30.25
1 marta = 11 to 14 oka		1 oka = 1283 g		1 yard = 36		1 perch = 1 chain ² = 484
1 kele = 2 marta		Unit Oka		Unit Foot		1 rood = 1210
Capacity, liquid		1 karat = $\frac{1}{1000}$		1 fathom = 6		1 acre (A.) = 4840
1 barile = 64.8 l		1 denke = $\frac{1}{1000}$		1 rod = 16.5		Unit Acre
1 bozzo = $\frac{1}{4}$ barile		1 dirhem = $\frac{1}{160}$		1 perch = 1 chain* (Gunther's) = 66		1 mile ² (sq. mi.) = 640
(Measured by weight)		1 drachme = $\frac{1}{160}$		1 chain* = 100 (engineer's) = 120		1 township† = 36.00
1 oka = 1282 g		1 miskal = $\frac{1}{800}$		1 bolt = 120		Volume
Unit Oka		1 eequi = $\frac{1}{4}$		1 furlong = 660		1 yard ³ (cu. yd.) = 0.764 559 45 m ³
1 gorraf = 9.75		1 yusdrum = $\frac{1}{4}$		1 cable length = 720		1 foot ³ (cu. ft.) = 28 317.0 cm ³
1 giarra = 58.5		1 rottel = 0.44		1 mile (statute) = 5280		1 inch ⁴ (cu. in.) = 16.387 162 cm ⁴
Tschechoslovak v. Czechoslovakia.		1 kantar = 44		1 mile (nautical)† = 6080.20		
Tunis. —m.c. 1895. Current.		1 tehki = 176 to 195		1 league (statute) = 3 st. mile		
		Area		1 league (nautical) = 3 n. mile		
Length		1 denum = 1600 archine ²		Mass		Unit Foot ²
1 pic arabe = 48.8 cm		1 denum = 913 m ²		1 pound avoirdupois (lb. av.) = 453.592 4277 g		1 inch ³ = $\frac{1}{1728}$
1 pic ture = 63.7 cm		1 djend = 100 a		= 7000 grain (gr.)		1 board foot (bd. ft.) = $\frac{1}{12}$
1 pic endazé = 67.3 cm		Capacity		1 grain = 61.798 918 24 mg		1 yard ³ = 27
The pic used depends upon the object measured.		1 kile = 32 to 43 l		(Three systems: avoirdupois, troy, apothecary.)		1 shipping ton = 40
Mass		1 zir ³ = 0.435 m ³				1 register ton = 100
1 uckor = 31.495 g		Unit Kile				1 cord (cd.) = 128
Unit Uckor		1 chinuk = $\frac{1}{4}$				
1 rottolo attari = 16		1 fortun = 4				
1 rottolo sueki = 18						
1 rottolo khaddari = 20						
1 cantaro = 100						
Capacity						
1 cafisso = 496 l						
1 millerole (Marseilles) = ca. 64 l						
Unit Cafisso						
1 saah = $\frac{1}{2}$ g						
1 whiba = $\frac{1}{16}$						
Turkestan.						
Length						
1 hasch = 0.7112 m						
Unit Hasch						
1 archine* = 1						
1 alteschin = 1						
Mass						
1 batman = 125 kg to 128 kg						
Unit Batman						
1 sir = $\frac{1}{16}$						
1 tscharik = $\frac{1}{16}$						
1 mintscha = $\frac{1}{16}$						
Turkey. —m.o.; current, var.:						
* Russian.						

United States.—Cont'd.

Unit	Gallon
1 gill (gi.)	$= \frac{1}{8}$
1 pint (pt.)	$= \frac{1}{4}$
1 quart (qt.)	$= \frac{1}{2}$
1 barrel*	$= 31.5$
1 hogshead	$= 63$

Uruguay.—m.c. 1894; m.o. 1866. Older = Spain (Castilian), more or less modified.

Venezuela.—m.c. 1914; m.o. 1857. Older = Spain (Castilian), more or less modified, and the following of Granada:

Length	
1 varu	$= 0.8$ m
1 meile	$= 6280$ varu

Mass	
1 libra	$= 1$ kg
1 bag	$= 62.5$ kg

Vereinigete Staaten v. United States.

Württemberg v. Germany
Yugoslavia. m.c. 1883
 Older:

Length	
1 linija	$= 21.95$ mm
1 palaz	$= 36.34$ mm
1 archine	$= 660$ mm to 712 mm
1 khvat	$= 1.896$ m
1 stopa	$= \frac{1}{6}$ kvat
Mass	
1 oka	$= 1280$ g
Unit	Oka
1 dram	$= \frac{1}{16}$
1 satlyk	$= \frac{1}{4}$
1 litra	$= \frac{1}{4}$
1 akov	$= 40$
1 tovar	$= 100$

Area	
1 stopa ²	$= 998.56$ cm ²
Unit	m ²
1 dunum	$= 700$
1 motyka	$= 800$
1 rahza	$= 2500$
1 dan oranja	$= 3597$
1 lunaz	$\left\{ \begin{array}{l} 5760 \\ = 1600 \text{ khvat}^2 \end{array} \right.$

Capacity
 (Liquids are measured by weight.)

Unit	Feddan
1 achir	$= \frac{1}{16}$
1 qasaba	$= \frac{1}{8}$
1 qamha	$= \frac{1}{8}$
1 habbah	$= \frac{1}{2}$
1 cafiz	$= \frac{1}{4}$
1 qirat	$= \frac{1}{4}$
1 daneq	$= \frac{1}{4}$
1 djarib	$= \frac{1}{4}$

Capacity
 (Measured by weight)

Unit	Cafiz
1 mudd	$= \frac{1}{8}$
1 kiladja	$= \frac{1}{4}$
1 caplite	$= \frac{1}{4}$
1 kist	$= \frac{1}{2}$
1 sda	$= \frac{1}{2}$
1 makuk	$= \frac{1}{8}$
1 ferik	$= \frac{1}{2}$
1 woche	$= 1$
1 khoull	$= 1$
1 modius	$= 1\frac{1}{4}$
1 artabe	$= 2$
1 amphora	$= 2$
1 gariba	$= 8$
1 den	$= 8$

Assyro-Chaldean-Persian System.

Length	
1 foot	$= 0.320$ m
Unit	Foot
1 finger	$= \frac{1}{6}$
1 palm	$= \frac{1}{4}$
1 zereth	$= 1$
1 cubit	$= 2$
1 pace	$= 6$
1 qasab	$= 12$
1 cane	$= 12$
1 chebel	$= 80$
1 stadion	$= 720$
1 ghalva	$= 5400$
1 mille	$= 5400$
1 parasang	$= 20\,000$
1 schoeme	$= 21\,600$
1 stathmos	$= 80\,000$
1 mansion	$= 80\,000$

Mass	
1 talent	$= 32.6$ kg
(Talent divided into 50, 60 or 100 mina)	
1 drachma	$= 0.01$ mina

Area	
1 gar	$\left\{ \begin{array}{l} = 14.7 \text{ m}^2 \\ = 144 \text{ foot}^2 \end{array} \right.$
Unit	Gar
1 dizaine	$= 10$
1 gan	$= 100$
1 gur	$= 1000$

Capacity

(Measured by weight)

Unit	Amphora
1 amphora	$= 32.6$ kg
1 eados	$= \frac{1}{2}$
1 mukuk	$= \frac{1}{8}$
1 woche	$= 1$
1 modius	$= 1\frac{1}{2}$
1 small artaba	$= 1\frac{1}{2}$
1 large artaba	$= 2$
1 large amphora	$= 3$
1 gariba	$= 8$

Egypt: System of the Pharaohs.

Length	
1 pied	$= 0.349$ m
Unit	Pied
1 doigt, finger	$= \frac{1}{16}$
1 theb	$= \frac{1}{8}$
1 palme	$= \frac{1}{4}$
1 choryos	$= \frac{1}{2}$
1 dielas	$= \frac{1}{2}$
1 sphame	$= \frac{3}{4}$
1 pied royal	$= 1$
1 zereth	$= 1$
1 pigeon	$= 1\frac{1}{4}$
1 coulée royale	$= 1\frac{1}{2}$
1 derah	$= 2$
1 coulée longue	$= 2$
1 pas	$= 2\frac{1}{2}$
1 xlon	$= 4\frac{1}{2}$
1 orgye	$= 6$
1 canne	$= 11\frac{2}{3}$
1 senus	$= 150$
1 stade	$= 500$ or 600
1 mille	$= 5000$
1 atour vulgaire	$= 15\,000$
1 schoeme	$= 18\,000$
1 parasange	$= 20\,000$
1 atour royal	$= 30\,000$

Mass

1 mine	$= 850$ g
Unit	Mine
1 gerah	$= \frac{1}{2000}$
1 sicle	$= \frac{1}{60}$
1 kikkar	$= 50$
1 talent	$= 50$

Area

1 pekeis	$= 27.405$ m ²
Unit	Pekeis
1 coulée ²	$= \frac{1}{16}$
1 sū	$= 6.25$
1 dizaine	$= 10$
1 rema	$= 50$
1 aurure	$= 100$
1 aroure	$= 100$
1 setta	$= 1000$

C. SYSTEMS OF ANTIQUITY

Our knowledge of the measures of antiquity is derived from the texts and monuments which have persisted to modern times, and some actual standards which have come down to us. The latter enable us to establish quite exact equivalence between the measures which they represent and ours. But most frequently such equivalence is only very roughly known, or is actually unknown. In this section are given only the more important or the best studied of these systems. The values given must not be taken too literally. Indeed, especially in antiquity, systems do not succeed one another; they evolve. Several may coexist among a single people; it is generally impossible to fix the dates at which these systems were used. The ancients had no capacity measures, such as ours; they weighed liquids and grains in terms of standards forming a second system of weights.

Arabian System.	Mass
Length	(So-called system of the Prophet)
1 foot	$= 0.320$ m
Unit	Foot
1 assban (finger)	$= \frac{1}{6}$
1 eabla (palm)	$= \frac{1}{4}$
1 cubit (new)	$= 1\frac{1}{2}$
1 cubit†	$= 2$
1 orgye (pace)	$= 6$
1 qasab	$= 12$
1 seir	$= 600$
1 ghalva	$= 720$
1 mille	$= 6000$
1 parasang	$= 18\,000$
1 barid	$= 72\,000$
1 veredus	$= 72\,000$
1 marhala	$= 144\,000$
Mass	
1 rotl	$= 340$ g
Unit	Rotl
1 dirhem	$= \frac{1}{16}$
1 nevat	$= \frac{1}{4}$
1 naseh	$= \frac{1}{6}$
1 oukia	$= \frac{1}{3}$
1 mau	$= 2$
1 mine	$= 2$
1 oeque	$= 4$
1 qauthar	$= 100$
1 kikkar	$= 125$
Area	
1 feddan	$= 14\,400$ cubit ² †
	$= 59$ a

* Wine barrel
 † Hacheme.

<i>Capacity</i>	
(Measured by weight)	
1 khar	= 34 kg
Unit	Khar
1 outen	= $1\frac{1}{2}$
1 man	}
1 mine	
1 hecte	= $1\frac{1}{2}$
1 apt	= $\frac{1}{2}$
1 keramion	= 1
1 metrete d'Héron	= $1\frac{1}{4}$
1 artabe des septante	= $1\frac{1}{2}$
1 artabe	}
1 letech	

Greek System.

<i>Length</i>	
1 pous* = 0.308 56 m	
Unit	Pous
1 daktylos (finger)	= $\frac{1}{6}$
1 condylos	= $\frac{1}{4}$
1 palestra (palm)	= $\frac{1}{4}$
1 dichas	= $\frac{1}{2}$
1 spithame (span)	= $\frac{1}{2}$
1 cubit†	= $1\frac{1}{2}$
1 Grecian cubit	= 2
1 bema (pace)	= $2\frac{1}{2}$
1 orgyia	= 6
1 amma (corde)	= 60
1 plethron	= 100
1 stadion	= 600
1 mille	= 4500
1 kiloorgyia	= 6000

<i>Mass</i>	
1 mina	= 425 g
Unit	Mina
1 chalcus	= $4\frac{1}{2}$
1 obol	= $\frac{1}{2}$
1 diobol	= $\frac{1}{4}$
1 drachma	= 0.01
1 tetradrachma	= 0.04
1 talent	= 60

<i>Area</i>	
1 pous ²	= 0.095 209 m ²
Unit	Pous ²
1 dekapode ²	= 100
1 plethron*	= 10 000

<i>Capacity</i>	
(Measured by weight)	
1 chenica	= 816 g
Unit	Chenica
1 cyanthos	= $\frac{1}{4}$
1 oxybaphon	= $\frac{1}{2}$
1 cotyle	= $\frac{1}{4}$
1 sexte	= $\frac{1}{2}$

* The Olympic foot of Egyptian origin.
† Lapidary.

Unit	Chenica
1 maris	= 2
1 choûs	= 3
1 hemiektos	= 4
1 hekto	}
1 modus	
1 metrete	= 36
1 medimnos	= 48
Hebrew System.	
<i>Length</i>	
1 sacred cubit	= 0.640 m
1 cubit*	= 0.555 m
Unit	Cubit*
1 finger	= $\frac{1}{24}$
1 palm	= $\frac{1}{6}$
1 zereth	= $\frac{1}{3}$

<i>Mass (Sacred system)</i>	
1 mina	= 850 g
Unit	Mina
1 obol	}
1 gerah	
1 rabah	= $2\frac{1}{2}$
1 bekah	= $1\frac{1}{2}$
1 shekel	= $\frac{1}{2}$
1 talent†	= 50

<i>Mass (Talmudist or Rabbinical system)</i>	
1 mina	= 354.2 g
Unit	Mina
1 pondiuscule	= $1\frac{1}{2}$
1 meluh	}
1 gerah	
1 obol	= $\frac{1}{2}$
1 zuzah	}
1 drachma	
1 shekel	= $\frac{1}{2}$
1 tetradmeluh	= 1
1 talent	= 60

<i>Capacity, dry</i>	
(Measured by weight)	
1 ephah† (old)	= 29.376 kg
1 ephah† (new)	= 21.420 kg
Unit	Ephah
1 log	= $\frac{1}{2}$
1 eub	= $\frac{1}{8}$
1 gomor	= 0.1
1 sath	}
1 modius	
1 cor	= 10

<i>Capacity, liquid</i>	
(Measured by weight)	
1 bath (old)	= 29.376 kg
1 bath (new)	= 21.420 kg
Unit	Bath
1 log	= $\frac{1}{2}$
1 hin	= $\frac{1}{6}$
1 cor	= 10

* Talmudist
† Of Moses.

Hindu System.

<i>Length</i>	
1 hasta	= 0.457 m
Unit	Hasta
1 angula (finger)	= $\frac{1}{4}$
1 vitasti (span)	= $\frac{1}{2}$
1 cubit	= 1
1 dhamush	}
1 orgyla	
1 cross	= 8000
1 gavvuti	= 16 000
1 yodjana	= 32 000

<i>Mass</i>	
1 retti	= 0.147 g
1 ratia	= 17 g
Unit	Retti
1 yava	= 0.1
1 masha	= 2, 5, 6, or 8
1 tank-sala	= 24
1 kona	= 48
1 tola	= 80
1 karsha	= 96
1 dharana	= { 32 (silver)
	= { 3200 (gold)
1 pala	= 320

Unit	Pala
1 tuba	= 100
1 bara	= 200
1 bara	= 2000
1 achita	= 20 000

<i>Capacity</i>	
(Measured by weight)	
1 drona	= 13.2 kg
Unit	Drona
1 pala	= $2\frac{1}{2}$
1 musti	}
1 kudava	
1 prastha	= $\frac{1}{2}$
1 adhaka	= $\frac{1}{4}$
1 cumbha (small)	= 2
1 shari	= 16
1 cumbha	= 20
1 baha	= 200

Persian System v. Assyrio-Chaldean-Persian.

Roman System.

<i>Length</i>	
1 pes (common or Drusian) (foot)	= 0.3196 m
1 legal pes (1st)	= 0.2962 m
1 legal pes (2nd)	= 0.2967 m
Unit	Pes
1 digitus (finger)	= $\frac{1}{16}$
1 uncia (inch)	= $\frac{1}{2}$
1 cubitus (cubit)	= $1\frac{1}{2}$
1 passus (pace)	= 5

1 decempeda (perch)	= 10
1 actus (chain)	= 120
1 mullarium (mule)	= 5000

<i>Mass</i>	
1 podium	= 326 g
Unit	Podium
1 scrupulus	= $\frac{1}{24}$
1 denier*	= $\frac{1}{60}$
1 denier†	= $\frac{1}{60}$
1 denarius	= $\frac{1}{24}$
1 solidus	= $\frac{1}{2}$
1 sextula	= $\frac{1}{24}$
1 miliaresium	= $\frac{1}{60}$
1 suthum	= $\frac{1}{4}$
1 duella	= $\frac{1}{36}$
1 sennun	= $\frac{1}{24}$
1 onnce	= $\frac{1}{2}$
1 tuma	= $\frac{1}{2}$
1 centum-podium	= 100

<i>Area</i>	
1 common pes ²	= 0.102 14 m ²
1 legal pes ² (1st)	= 0.087 73 m ²
1 legal pes ² (2nd)	= 0.088 03 m ²
Unit	Pes ²
1 decempeda	= 100
1 actus (small)	= 400
1 elma	= 3600
1 versum	= 10 000
1 actus	= 14 400
1 jugerum	= 28 800
1 heredium	= 57 600
1 centuria	= 5 760 000
1 saltus	= 23 040 000

<i>Capacity, dry</i>	
1 sextarius	= 544 g
Unit	Sextarius
1 modius	= 16
1 quadrantal	= 48
1 pes† (of water)	= 48

<i>Capacity, liquid</i>	
(Measured by weight)	
1 sextarius	= 514 g
1 sextus	= 514 g

Unit	Sextarius
1 cyathus	= $\frac{1}{24}$
1 acetabulum	= $\frac{1}{8}$
1 quartus	= $\frac{1}{4}$
1 hemina	= $\frac{1}{2}$
1 congius	= 6
1 urna	= 24
1 amphora	= 48
1 euleus	}
1 dohium	
	= 960

* Silver
† Neroman.
‡ Legal pes (2).

SYMBOLS, BASIC CONSTANTS, CONVERSION DATA, DIMENSIONS, DEFINITIONS

Symbols and Abbreviations	16
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BASES OF DATA CONTAINED IN I. C. T.

When many experts are cooperating in the assembling of data, it is essential that the same values for the fundamental constants and for the necessary conversion factors shall be employed by all. Consequently, at the very beginning of the work, the Editors compiled a set of accepted, or I. C. T., values for such constants and factors; and the Experts were instructed to base all their data upon these values. In the few cases in which it was not feasible to follow these instructions, the data were to be accompanied by a statement of the actual basis upon which they rest.

In compiling this list, and in choosing the accepted values of such of the quantities as were independently chosen, the Editors secured and utilized the advice of the United States Bureau of Standards, the National Physical Laboratory of Great Britain, and the Société Française de Physique. Acknowledgments are also due to Dr. F. E. Fowle, of the Smithsonian Institution, for his valued assistance in preparing the initial table of fundamental constants, and to Professors T. W. Richards and G. P. Buxter for their recommendations concerning the table of atomic weights.

The list so prepared comprised (1) a table of atomic weights (p. 43), (2) a set of nine basic constants (p. 17) (the estimated uncertainties were added at a later date), (3) twenty-one derived constants (computed directly from the nine basic constants), five conventional constants, and two experimental constants (p. 18) and (4) certain conversion factors selected from Tables 1 to 79 (p. 20-32). Although the accepted values were close approximations to the best values at that time available, it was not claimed that they were such best values.

SYMBOLS AND ABBREVIATIONS

Except as the contrary is definitely stated, the following symbols and abbreviations will always be used in the sense here indicated. Other symbols will be defined in the sections in which they are used. For those quantities which are included in the list of symbols approved by the International Association of Chemical Societies (4, 119: 502; 21), the symbols so approved have, in general, been used; in some cases, this has necessitated the use of the same symbol to represent two distinct quantities; the context will serve to indicate which interpretation is correct. For explanations of the several technical terms, consult Selected Technical Terms, p. 34.

\AA	Angstrom unit	ap.	Apothecaries
A.	Acre	Av.	Average
A_n	Normal atmosphere	av.	Avoidupois
A_ϕ	Atmosphere, 15° latitude	a	Van der Waal's pressure constant
A	Atomic weight. Maximum work of a thermodynamic system		Capillary constant
θ	Arc	BTU	British Thermal Unit
(a)	Based on Int. ohm and Int. ampere as defined by silver voltameter. (See Int. elec. units, p. 27)	bbl.	Barrel
		bd.	Board
		bu.	Bushel
abs.	Absolute	b	Van der Waal's volume constant

C	Centigrade	gr.	Grain
CTU	Centigrade thermal unit	fl.	Fluid
C	Concentration. Molecular heat	fps	Foot-pound-second system of units
C_1, C_2	Radiation constants of black body. (See definition of black body)	fpsec	Fps electrostatic system
C_1	Intensity coefficient. (See definition of black body)	fpam	Fps electromagnetic system
C_p, C_v	Molecular heat at constant pressure, at constant volume	ft.	Foot
c	Velocity of light in vacuo	ft. ²	Square foot
c	Carat. Centi-	ft. ³	Cubic foot
ca	Candle	fur.	Furlong
ca.	circa = about, approximately	G	Gravitation constant
cal	Calorie (gram)	g	Gram
cd.	Cord	gal.	Gallon
cf.	Confer = compare	gi.	Gill
cg	Centimeter-gram-second system of units	gr.	Grain
cgse	Cgs electrostatic system	g	Acceleration due to gravity
cgsm	Cgs electromagnetic system	g	Standard gravity
ch.	Chain	HP	Horse-power
cm	Centimeter	H	Atomic weight of hydrogen
cm ²	Square centimeter	h	Planck's constant of action
cm ³	Cubic centimeter	h	Hecto-
c.p.	Candle power	ha	Hectare
cu.	Cubic	hhd.	Hogshead
cu ft.	Cubic foot	h.p.	Horse-power
cwt.	Hundredweight	hr	Hour
c	Specific heat = heat capacity of the substance	h	Height
c_p, c_v	Specific heat at constant pressure, at constant volume	Int.	International
D	Density	I. C. T.	International Critical Tables
d	Derivative. Deci-	I	Electric current
da	Day	ibid.	<i>Ibidem</i> = in the same place
deg	Thermometric degree, absolute C unless contrary is indicated	I_{cal}	<i>Id est</i> = that is
dk	Deka-	in.	Inch
dm ³	Cubic decimeter	in. ³	Cubic inch
dr	Dram	J	Radiance
dwt	Pennyweight	J_λ	Intensity of monochromatic radiation of wave-length λ
d	Density. Diameter	J_m	Value of J_λ for $\lambda = \lambda_m$
d_c	Critical density	K	Karat. Kelvin, or absolute C. scale of temperature
d_t	Specific gravity at temperature t_1 , with reference to water at temperature t_2	K	Kilogram
E	Electromotive force	km	Kilometer
E_0	Mean translational energy of molecule of ideal gas at 0°C	km ²	Square kilometer
e	Electronic charge	k	Velocity coefficient of chemical reaction
e	Base of natural system of logarithms = 2.71828 +	k_0	Boltzmann's gas constant
$e.g.$	<i>Esemph gratia</i> = for example	L	Latent heat per mole
em	Cgs unit of quantity of electricity	l	Liter
emf	Electromotive force	l.	Long
equiv	Electrochemical equivalent	lat.	Latitude
e_s	Cgs unit of quantity of electricity	lb.	Pound
<i>etc.</i>	<i>Et cetera</i> = and so forth	li.	Link
<i>et seq.</i>	<i>Et sequentes</i> = and the following	liq.	Liquid
e_0	Ratio of E_0 to T_0	long.	Longitude
F	Faraday	l	Length. Latent heat per gram
F	Fahrenheit	M	Molecular weight
fath.	Fathom	$M[\omega]$	Molecular rotatory power
		$M[\omega]$	Molecular magnetic rotatory power
		m_e	Mass of electron at low velocity
		m	Meter. Milli-
		m ²	Square meter
		max.	Maximum
		mg	Milligram
		mi.	Mile
		min	Minute

min.	Minim. Minimum	T ₀	Ice point, absolute C	μ	Susceptibility (magnetic).	m	Minim
ml	Milliliter	T	Temperature on absolute C scale	μ	Electrical (volume) conductivity	3	Apothecaries' ounce
mmf	Magnetomotive force			μ	Equivalent conductivity (electrical)	3	Apothecaries' dram
mm	Millimicron. Millimicro-	T _c	Critical temperature, absolute C	μ	Wave-length. λ ₅₈₉₀ = spectral line of wave-length = 5890 Å	3	Apothecaries' scruple
m	Mass of a hydrogen atom	t	Metric ton	λ	Wave-length of maximum monochromatic radiance of black-body at stated temperature	3	Degree (arc or temperature)
N	Numeric	t.	Troy	λ _m	Permeability (magnetic)	3	Minute of arc (sexagesimal)
N ₀	Avogadro's number	tn.	Ton	μ	Micron. Micro-. Molecular conductivity (electrical)	3	Second of arc (sexagesimal)
N _∞	Rydberg's universal series constant	t.	Time. Temperature C (above ice point)	μ	Micromeron. Micromicro-	3	Percent = per hundred
n	Refractive index	t _c	Critical temperature C (above ice point)	μ	Frequency	3	Per thousand = 0.1 %
n _a , n _k	Transport number for anion, kation	U. S.	United States of America	μ	Rydberg's fundamental frequency	3	Dimensional expressions are enclosed in []. In text, [] is used to inclose a second reading. (N.g., length [diameter] of the bar is 10 cm [1 cm] = length of bar is 10 cm, diameter of bar is 1 cm)
n ₀	Loschmidt's number	v	Volume	μ	Ratio of circumference of a circle to its diameter	3	A < B [A > B] denotes that A is less than [greater than] B
O	Atomic weight of oxygen	v ₀	Volume per gram-mole of ideal gas at 0°C and A _N	μ	Stefan's constant (radiation)	3	Negative of < ; A < B denotes that A is not less than B
os.	Ounce	v	Vide = see	μ	Fluidity. Angle	3	Combination of < and = ; A ≤ B denotes that A is equal to or less than, B
P	Pressure	(v)	Based on Int. ohm and Int. volt as defined by standard cell. (See Int. elec. units, p 27)	μ	Luminous flux	3	Is not equal to
pk	Peck			μ	Ohm	3	Identically equal to; used in defining symbols, etc.
pt.	Pint			μ	Relative molecular magnetic rotatory power with reference to water	3	Approximately (or essentially) equal to
p	Pressure			μ	Solid angle	3	Infinity
p _v , p _r	Critical pressure, reduced pressure	v	Volume	μ	Specific magnetic rotatory power	3	
Q	Quantity	v _c , v _r	Critical volume, reduced volume				
q	Quintal	W	Electrical resistance				
qt.	Quart	wt.	Weight				
q.s.	Quod vide = which see	w	Wien's displacement constant				
R	Réaumur	yd.	Yard				
R	Gas constant per mole of ideal gas. Electrical resistance.	yr	Year				
rd.	Rod	Z	Atomic number				
r	Radius	α	Degree of dissociation.				
r _G	Specific refractivity (Gladstone and Dale)	[α]	Angle of optical rotation				
r _L	Specific refraction (Lorentz and Lorenz)	β	Specific heat constant				
r ₁	Radius of first Bohr ring, hydrogen	γ	Surface tension. Ratio of c _p /c _v (Gamma (magnetic unit))				
S.E.	Siemens unit	Δ	Diffusion coefficient				
S	Entropy	ε	Dielectric constant				
s	Stere	ε	Electrode potential				
s.	Scruple	ε ₀ , ε _∞	Electrode potential above that of normal hydrogen, of normal calomel, electrode				
sec	Second (mean solar unless contrary is stated)	η	Viscosity				
sh.	Short	θ	Angle (plane). Temperature C above ice point				
sq	Square						
sq ft.	Square foot						

¹ In every computation it is tacitly assumed that the values employed are exact. If but three digits are employed, it is assumed that all others are zero; if a computing machine is used, the assumption is carried out to the extreme limit of the machine; if logarithms are used, it is carried to the limit within which the logarithms are interpolated. To adopt an accepted or a conventional

FUNDAMENTAL CONSTANTS

By an *accepted*, *conventional*, or *defined* value, is meant one which is to be regarded as exactly correct for purposes of computation.¹ Thus, errors from computational approximations are avoided and do not enter into consideration in any future revision of the computed result for a discovered difference between the true and the accepted value. When the computation involves several accepted values, it is especially important that each shall be regarded as exactly correct, for only then can the result be independently revised (without complete recalculation) for changes in the values of each. For this reason the logarithms of the several accepted values are given to the full precision of Vega's seven-place table. The degree of uncertainty in the value accepted is indicated by the number of significant figures retained in the value itself, not by the logarithm.

value, and to give us its logarithm an abbreviated value, is to introduce an ambiguity of a magnitude determined by the degree of abbreviation of the logarithm. But the sole object in adopting accepted or conventional values is to avoid ambiguity.

ACCEPTED BASIC CONSTANTS Units: cgs, °C, liter, A_N, absolute electric

Quantity	Value	Uncertainty	Log ₁₀ (value)
c Velocity of light	2 9986 × 10 ¹⁰ cm sec ⁻¹	0 0003	10.476 9185
G Gravitation constant	6 66 × 10 ⁻⁸ cm ³ g ⁻¹ sec ⁻²	0 01	8.823 4742
e Electronic charge	4 774 × 10 ⁻¹⁰ es	0 005	10.678 8824
e Electronic charge	*1 592 × 10 ⁻²⁰ cm		20.201 9639
e/m ₀ Electronic ratio	5 305 × 10 ¹⁷ es g ⁻¹	0 010	17.724 6854
e/m ₀ Electronic ratio	*1 769 × 10 ⁷ enug ⁻¹		7.247 7609
F Faraday	9 6500 × 10 ⁴ coulombs	0 0010	4.984 5273
F Faraday	*2 893 65 × 10 ¹⁴ es		14.461 4458
v ₀ Volume 1 mole at 0°C, A _N	†22 4115 × 10 ³ cm ³ mole ⁻¹	0 002	4.350 4709
h Planck's constant	6 554 × 10 ⁻²⁷ erg sec	0 001	27.816 5004
T ₀ Ice point, absolute	273 1 deg C	+0.15 to -0.05	2.436 3217
O Atomic weight of oxygen	16 000 (by definition)	(definition)	1.204 1200

* This value is derived from the preceding one, which is the value actually accepted.

† Derived from volume at 0°C, A_N = 22.412 liters/g-mole on assumption log₁₀ (A_N/A₀) = 0.000 0214, liter = 1000.027 cm³.

ACCEPTED CONSTANTS:—CONVENTIONAL AND NON-BASIC Units: cgs, °C, liter, A_n absolute electric, international angstrom

Quantity		Value	Log ₁₀ (value)
<i>A. Derived Constants</i>			
<i>R</i>	Gas constant	$8\ 315 \times 10^7$ erg deg ⁻¹ mole ⁻¹	7.919 8658
<i>R</i>	Gas constant	0 082 06 liter atm deg ⁻¹ mole ⁻¹	2.914 1375
<i>R</i>	Gas constant	1 9869 cal ₁₅ deg ⁻¹ mole ⁻¹	0.298 1703
<i>N₀</i>	Avogadro's number	$6\ 061 \times 10^{23}$ mole ⁻¹	23.782 5634
<i>n₀</i>	Loschmidt's number	$2\ 705 \times 10^{19}$ cm ⁻³ (at 0°C, A _n)	19.432 0925
<i>k₀</i>	Molecular gas constant	$1\ 372 \times 10^{-16}$ erg deg ⁻¹	16.137 3024
<i>E₀</i>	Translational energy of molecules, 0°C	$5\ 620 \times 10^{-14}$ erg	14.749 7154
<i>e₀</i>	Ratio of <i>E₀</i> to <i>T₀</i>	$2\ 058 \times 10^{-16}$ erg deg ⁻¹	16.313 3937
<i>m_H</i>	Mass of hydrogen atom	1.663×10^{-24} g	24.220 7679
<i>m₀</i>	Electronic mass	$8\ 999 \times 10^{-28}$ g	28.954 1970
<i>r₁</i>	Radius 1st Bohr ring of hydrogen	0.5305×10^{-8} cm	9.724 6912
<i>h/e</i>	Photo-electric constant	$1\ 373 \times 10^{-17}$ erg sec es ⁻¹	17.137 6240
<i>h/e</i>	Photo-electric constant	4.117×10^{-15} volt sec	15.614 5425
<i>hc/e</i>	Photo-electric constant	$4\ 117 \times 10^{-7}$ erg cm es ⁻¹	7.614 5425
<i>hc/e</i>	Photo-electric constant	$1\ 2344 \times 10^4$ volt Å	4.091 4610
<i>β</i>	Specific heat constant	$4\ 778 \times 10^{-11}$ sec deg	11.679 2040
<i>σ</i>	Stefan's constant	$5\ 709 \times 10^{-5}$ erg cm ⁻² sec ⁻¹ deg ⁻⁴	5.756 5416
<i>C₁</i>	Radiation constant, first	$3\ 703 \times 10^{-5}$ erg cm ² sec ⁻¹	5.568 5233
<i>C₂</i>	Radiation constant, second	1 433 cm deg	0.156 1225
<i>w</i>	Wien's displacement constant	0 2885 cm deg	1.460 1933
<i>C₃</i>	Intensity coefficient	$1\ 301 \times 10^{-4}$ erg cm ⁻³ sec ⁻¹ deg ⁻³	4.114 2762
<i>ν_R</i>	Rydberg frequency	$3\ 2775 \times 10^{15}$ sec ⁻¹	15.515 5372
<i>N_R</i>	Rydberg wave number	$1\ 0930 \times 10^5$ cm ⁻¹	5.038 6187
<i>B. Conventional Constants</i>			
<i>A_n</i>	Normal atmosphere	$1\ 0132\ 50 \times 10^6$ dyne cm ⁻²	6.005 7166
<i>A₄₅</i>	Atmosphere, latitude 45°	$1\ 0132\ 00 \times 10^6$ dyne cm ⁻²	6.005 6952
<i>λ</i>	Wave-length of red Cd line is	6438 4696 Å	4.808 7827
<i>g</i>	Standard gravity	980 665 cm sec ⁻²	2.991 5207
	Aberration constant	20 47"	1.311 1178
<i>C. Experimental Constants</i>			
	Grating space in calcite	3 028 Å	0.481 1559
<i>H</i>	Atomic weight of hydrogen	1 0077	0.003 3313
†	Liter	1000 027 cm ³	3.000 0117
†	Gram calorie (20°C)	4.181 joule	0.621 2802
†	Gram calorie (15°C)	4.185 joule	0.621 6955
†	Gram calorie (mean)	4.186 joule	0.621 7992
†	British Thermal Unit (39°F)	1060 4 joule	3.025 4697
†	British Thermal Unit (mean)	1054 8 joule	3.023 1701
†	British Thermal Unit (60°F)	1054.6 joule	3.023 0878
†	International ohm	1 000 52 ohm	0.000 2259
†	International ampere (v)§	0 999 90 ampere	0.999 9566
†	International ampere (a)§	0 999 93 ampere	0.999 9696

* This value is derived from the preceding one, which is the value actually accepted.

† In the original list, this quantity was included solely in the list of conversion factors; its value, however, is an independently selected, accepted constant, and, consequently, is treated as exact in all computations

§ (v) = Based on Int. ohm and Weston normal cell = 1.018300 Int. volts at 20°C, (a) = based on deposit of 1.11800 mg of silver per Int. ampere second.

CONVERSION FACTORS AND DIMENSIONAL FORMULAE

N. ERNEST DORSEY

In the following tables are given the factors by which values expressed in other units must be multiplied in order to obtain their equivalents in units of the centimeter-gram-second (cgs) system. To convert in the reverse direction, divide by the factor given. The dimensional formula in the cgs, or any similarly constructed, system is given in the title of each table.

Conversion Factors.—With few exceptions,¹ the values given are based exclusively upon legal definitions, conventional con-

¹ The exceptions are (1) astronomical unit of distance, (2) parsec, (3) sidereal second, (4) certain units of luminous intensity, (5) international electrical units prior to 1911, and (6) the data for hydrometers

stants, and the I. C. T. accepted values (p. 16). Consequently, they are computable to as extreme a precision as may be desired. They have been computed by means of Vega's seven-place logarithms, and it is hoped that their logarithms as given are correct to a unit in the last digit. Obviously, those factors which involve the accepted value of an experimentally determined constant will be in error by an amount determined by the error in the accepted value; but quantities converted by means of the logarithms given will retain their same relative precision, however great this may be, within the limit set by the seven-place table, and may at any time be as exactly corrected for a revision of the accepted value. This would not be true if an abbreviated logarithm were used, unless the exact value of the abbreviated logarithm itself were given. The latter would be equivalent merely to the adoption of another accepted value for the experimental constant involved;

and the new value so fixed would, in general, be expressible only by an indefinite number of digits. The former procedure is to be preferred.

Frequently, the same factor applies to more than one type of physical quantity; if the units of the several types have distinctive names, separate tables are given, otherwise, not. In general, the tables are arranged in the order of increasing complexity of the dimensional formulae. Some quantities for which conversion factors are seldom required, and a few dimensionless quantities have been grouped together in Table 78. The dimensional formulae of the more important electric and magnetic units, and the numerical relations connecting these units in the three systems most frequently used, are assembled in Table 77. To find the conversion factor for a given quantity, consult the index below.

Dimensions.—Two types of dimensional equations need to be considered, viz.: (1) Those in which the dimensions are expressed in terms of the quantities directly involved in the phenomenon under consideration, and (2) those in which the dimensions are expressed in terms of certain fundamental units.

As an illustration of the first we may consider the force of repulsion between two point charges (e, e') of electricity situated at a distance, r , apart in a medium of dielectric constant ϵ . If this force is denoted by f , then $f = ee'/\epsilon r^2$, and we may write $[\epsilon] = [fe^2]$, $[\epsilon] = [e^2f^{-1}l^{-2}]$, etc., where $[]$ denotes that we are concerned with dimensions only; $[l]$ denotes the dimension of length, $[f]$ that of force, etc. These dimensional equations are true whatever be the system of units employed. As they involve quantities, such as force, which can be expressed in terms of other units that are usually considered more fundamental, such dimensional equations will be referred to as "unreduced," in order to distinguish them from those of the second class in which the dimensions are expressed solely in terms of a small number of fundamental units.

It is evident that the dimensions of a quantity in terms of fundamental units can be assigned only in relation to a specific system of units and to a specific method of derivation. For example, (1) if the unit of volume is defined as the volume occupied by a unit mass of water when at its greatest density under a pressure of one atmosphere, then the volume so defined will be independent of the units of length and time, and will vary directly as the unit of mass; we will have $[v] = [m]$. (2) If the unit of

volume is defined as the volume occupied by a mass of water (when at its greatest density, etc.) which is equal to the mass of a specified block of platinum, then the volume so defined will not change as we change our units of length, of mass, and of time; that is $[v] = [v]$. In this case $[v]$ is an independent unit and must be so regarded in all dimensional equations. (3) If the unit of volume is defined as the volume of a cube of which the edge is equal to the unit of length then $[v] = [l^3]$. A unit may be defined in any desired unambiguous manner and, in general, the dimensions of the unit will vary from definition to definition.

Dimensional equations of the second type stand in marked contrast to those of the former, in being far less general and in implying the acceptance of a very exactly defined system of units. This, however, is the type of equation which is commonly in mind when dimensional equations are mentioned, and is probably the one which is the more generally useful; the unreduced dimensional expressions (the first type), however, are often simpler, convey more detailed information, and in many cases are to be preferred. For these reasons, unreduced dimensional expressions are to be found in explanations of technical terms (p. 34); they are followed by others, the final one in each case being the fully reduced dimensions on the centimeter, gram, second, degree centigrade absolute, electrostatic system. Wherever necessary, this system of units will be denoted by the symbol *cgs* in order to distinguish it from the corresponding electromagnetic system, which will be denoted by *cgs_m*. In the conversion tables, dimensional formulae only of the *cgs* and of the *cgs_m* systems are given. In the *cgs* system, the fundamental units and their symbols are those of length $[l]$ the centimeter, of mass $[m]$ the gram, of time $[t]$ the mean solar second, of temperature $[T]$ the absolute centigrade degree, and of dielectric constant $[\epsilon]$, that of a vacuum. The fundamental units in the *cgs_m* system differ from those in the *cgs* system only by the replacement of dielectric constant by magnetic permeability $[\mu]$, the unit being the permeability of a vacuum.

It should be realized that dimensional expressions give no positive information regarding the ultimate nature of the quantity to which they refer; e.g., energy and torque have the same dimensions, but differ vastly in their nature.

Symbols.—(U. S.) before a logarithm denotes that it is based upon the U. S. yard; for explanation of other symbols, see Symbols and Abbreviations, p. 16.

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CONVERSION FACTORS

1. Length [*l*] (see also p. 1)

Unit	Value	Log ₁₀ (value)
1 angstrom unit	1 0000 × 10 ⁻⁸ cm	8.000 0000
1 micron	1 0000 × 10 ⁻⁴ cm	4.000 0000
1 mil	2.5400 × 10 ⁻³ cm	3.404 8346
1 inch	2.5400 cm	(U. S.) 0.404 8346
1 foot	30.480 cm	(U. S.) 1.484 0158
1 yard (U. S.)	91.44018 cm	1.961 1371
1 yard (British)	91.43992 cm	1.961 1350
1 mile, statute	1.6093 km	(U. S.) 0.206 6497
1 light year	9.4627 × 10 ¹² km	12.978 0131
1 astronomical unit	1.495 × 10 ⁸ km	8.174 6712
1 parsec	3 084 × 10 ¹³ km	13.489 09

2. Length⁻¹; Absorptivity; Coefficient of Absorption* [*l*⁻¹]

1 angstrom ⁻¹	1.0000 × 10 ⁸ cm ⁻¹	8.000 0000
1 micron ⁻¹	1 0000 × 10 ⁴ cm ⁻¹	4.000 0000
1 mil ⁻¹	393 70 cm ⁻¹	2 595 1654
1 inch ⁻¹	0 39370 cm ⁻¹	(U. S.) 1 595 1654
1 foot ⁻¹	3 2808 × 10 ⁻² cm ⁻¹	(U. S.) 2 515 9842
1 mile ⁻¹	0 62137 km ⁻¹	1.793 3503

* Coefficient of transmission (*τ*) is so defined that $-\log \tau$ = coefficient of absorption3. Mass [*m*]; Weight (see also p. 1)

1 grain	64.799 mg	1 811 5677
1 carat (metric)	200 000 mg	2 301 0300
1 ounce (avoirdupois)	28.350 g	1 452 5458
1 ounce (apothecary) or (troy)	31.103 g	1 492 8090
1 pound (avoirdupois)	453 59243 g	2.656 6658
1 pound (apothecary) or (troy)	373.2417 g	2.571 9902
1 ton, short (2000 pounds)	907 185 kg	2 957 6958
1 ton, long (2240 pounds)	1016 047 kg	3 006 9138
1 slug (g.)	14 594 kg	1.164 1707
1 gram mole	M. W.† g.	
1 molecule/M. W.†	1.6498 × 10 ⁻²⁴ g	24.217 4366
1 assay ton	29 1667 g	1 464 8868

† M. W. denotes the molecular weight of the substance

4. Mass⁻¹ [*m*⁻¹]

1 grain ⁻¹	1 5432 × 10 ⁻² mg ⁻¹	2 188 4323
1 ounce ⁻¹ (avoirdupois)	3.5274 × 10 ⁻² g ⁻¹	2 547 4542
1 ounce ⁻¹ (troy)	3 2151 × 10 ⁻² g ⁻¹	2 507 1910
1 pound ⁻¹ (avoirdupois)	2 2046 × 10 ⁻² g ⁻¹	3.343 3342
1 ton ⁻¹ (2000 pounds)	11 0231 × 10 ⁻⁴ kg ⁻¹	3.042 3042
1 ton ⁻¹ (2240 pounds)	9 8421 × 10 ⁻⁴ kg ⁻¹	4.993 0862
1 (gram mole) ⁻¹	†(M. W.) ⁻¹ g ⁻¹	

† M. W. denotes the molecular weight of the substance

5. Time [*t*]

1 second, mean solar	1 00273791 sidereal sec	0.001 1874
1 second, sidereal	0 997270 sec (mean solar)	1 998 8126
1 hour (tropical, mean solar)	3 6000 × 10 ³ sec (mean solar)	3.556 3025
1 day (tropical, mean solar)	8 6400 × 10 ⁴ sec (mean solar)	4.936 5137
1 day (sidereal)	8 6164 × 10 ⁴ sec (mean solar)	4.935 3263
1 year (tropical, mean solar)	31 5569 × 10 ⁶ sec (mean solar)	7.499 0946
1 year (tropical, mean solar)	365 2422 day (mean solar)	2 562 5809

CONVERSION FACTORS

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CONVERSION FACTORS.—Continued

6. Time⁻¹; Frequency; "Velocity" of a Process [*t*⁻¹]

1 second ⁻¹ (sidereal)	=	1 002738 sec ⁻¹ (mean solar)	0.001 1874
1 minute ⁻¹ (mean solar)	=	1 66667 × 10 ⁻³ sec ⁻¹ (mean solar)	2.221 8487
1 hour ⁻¹ (mean solar)	=	2.77778 × 10 ⁻⁴ sec ⁻¹ (mean solar)	4.443 6975
1 day ⁻¹ (mean solar)	=	1 15741 × 10 ⁻⁵ sec ⁻¹ (mean solar)	5.063 4863
1 year ⁻¹ (mean solar)	=	3 16888 × 10 ⁻⁸ sec ⁻¹ (mean solar)	8.500 9054
1 year ⁻¹ (mean solar)	=	2.73791 × 10 ⁻³ day ⁻¹ (mean solar)	3.437 4191
1 electron-volt, quantum ⁻¹	=	2 4292 × 10 ¹⁴ sec ⁻¹ (mean solar)	14.385 4575
1 joule per mole, <i>N</i> ₀ ⁻¹ quantum ⁻¹	=	2 5173 × 10 ⁹ sec ⁻¹ (mean solar)	9.400 0301
1 velocity of light, (ångström unit) ⁻¹	=	2 9986 × 10 ¹⁸ sec ⁻¹ (mean solar)	18.476 9185
1 velocity of light, millimicron ⁻¹	=	2 9986 × 10 ¹⁷ sec ⁻¹ (mean solar)	17.476 9185
1 velocity of light, micron ⁻¹	=	2 9986 × 10 ¹⁴ sec ⁻¹ (mean solar)	14.476 9185
1 velocity of light, millimeter ⁻¹	=	2 9986 × 10 ¹¹ sec ⁻¹ (mean solar)	11.476 9185
1 velocity of light, meter ⁻¹	=	2 9986 × 10 ⁸ sec ⁻¹ (mean solar)	8.476 9185

7. Angle [*θ*]

1 radian	=	57.29578 degree	1.758 1226
1 circumference	=	6 28319 radian	0.798 1799
1 quadrant	=	1.57080 radian	0.196 1199
1 degree	=	1.74533 × 10 ⁻² radian	2.241 8774
1 minute	=	2.90888 × 10 ⁻⁴ radian	4.463 7261
1 second	=	4.84814 × 10 ⁻⁶ radian	6.685 5749

8. Angle⁻¹ [*θ*⁻¹]

1 circumference ⁻¹	=	0.159155 radian ⁻¹	1.201 8201
1 degree ⁻¹	=	57.29578 radian ⁻¹	1.758 1226
1 minute ⁻¹	=	3.43775 × 10 ³ radian ⁻¹	3.536 2739
1 second ⁻¹	=	2.06265 × 10 ⁵ radian ⁻¹	5.314 4251

9. Solid Angle [*ω*]

Entire space	=	12 5664 steradian	1.099 2099
1 hemisphere	=	6 2832 steradian	0.798 1799
1 square degree	=	3.0462 × 10 ⁻⁴ steradian	4.483 7548

10. Solid Angle⁻¹ [*ω*⁻¹]

Entire space ⁻¹	=	7.9577 × 10 ⁻² steradian ⁻¹	2.900 7901
1 hemisphere ⁻¹	=	1.5910 × 10 ⁻¹ steradian ⁻¹	1.201 8201
1 square degree ⁻¹	=	3.2828 × 10 ³ steradian ⁻¹	3.516 2452

11. Temperature [*T*] (See also Thermometry, p. 52)

Fahrenheit.	<i>x</i> [°] F	= ($\frac{5}{9}$)(<i>x</i> - 32) [°] C
Réaumur.	<i>x</i> [°] R	= ($\frac{4}{5}$)(<i>x</i>) [°] C
Absolute (Centigrade).	<i>x</i> [°] K	= (<i>x</i> - <i>T</i> ₀) [°] C
Absolute (Fahrenheit).	<i>x</i> [°] Rankine	= ($\frac{5}{9}$)(<i>x</i> - 491.58) [°] C

12. Degree⁻¹ (Thermometric); Expansivity; Curie's Constant (magnetic) [*T*⁻¹]

1 per degree F	=	1.8000 per degree C	0.255 2725
1 per degree R	=	0.8000 per degree C	1.903 0900
1 per degree K	=	1.000 per degree C	0.000 0000

13. Luminous Flux [*ψ*]

By definition, the total luminous flux emitted by a point source of one spherical candle power is 4π lumen.

14. Dielectric Constant; Electrical Inductivity [*ε*]; [*μ*-*U*⁻²/*c*²]

Specific inductive capacity is of zero dimensions. It is numerically equal to the dielectric constant expressed in cgsu or in fpsu units.

1 cgsu unit	=	8.9916 × 10 ²⁰ cgsu unit	20.953 8370
1 fpsu unit	=	1.0000 cgsu unit	0.000 0000
1 fpmu unit	=	1.0764 × 10 ⁻³ cgsu unit	3.031 9684
1 fpmu unit	=	9.6784 × 10 ¹⁷ cgsu unit	17.985 8054

15. Magnetic Permeability; Susceptibility [*ε*-*U*⁻²/*c*²]; [*μ*]

1 cgsu unit	=	8.9916 × 10 ²⁰ cgsu unit	20.953 8370
1 fpmu unit	=	1.0000 cgsu unit	0.000 0000
1 fpsu unit	=	1.0764 × 10 ⁻³ cgsu unit	3.031 9684
1 fpsu unit	=	9.6784 × 10 ¹⁷ cgsu unit	17.985 8054

CONVERSION FACTORS.—Continued

16. Area [l^2]			
1 circular millimeter	mm ²	$7.8540 \times 10^{-2} \text{ cm}^2$	3.895 0899
1 circular mil	mi ²	$5.0671 \times 10^{-6} \text{ cm}^2$	(U. S.) 6.704 7591
1 square inch	in ²	6.4516 cm ²	(U. S.) 0.809 6692
1 square foot	ft ²	$9.2903 \times 10^2 \text{ cm}^2$	(U. S.) 2.968 0316
1 square yard	yd ²	$8.3613 \times 10^3 \text{ cm}^2$	(U. S.) 3.922 2742
1 square mile	mi ²	2.5900 km ²	(U. S.) 0.413 2995
1 aro	ar	$1.0000 \times 10^2 \text{ m}^2$	2.000 0000
1 hectare	ha	$1.0000 \times 10^4 \text{ m}^2$	4.000 0000
1 acre	ac	$4.0469 \times 10^3 \text{ m}^2$	3.607 1196
17. Area ⁻¹ [l^{-2}]			
1 (circular millimeter) ⁻¹	mm ⁻²	127.324 cm ⁻²	2.104 9101
1 millimeter ⁻²	mm ⁻²	100.0000 cm ⁻²	2.000 0000
1 meter ⁻²	m ⁻²	0.0001 cm ⁻²	4.000 0000
1 (circular mil) ⁻¹	mi ⁻²	$1.9735 \times 10^5 \text{ cm}^{-2}$	(U. S.) 5.295 2409
1 inch ⁻²	in ⁻²	0.15500 cm ⁻²	(U. S.) 1.190 3308
1 foot ⁻²	ft ⁻²	$1.0764 \times 10^{-2} \text{ cm}^{-2}$	(U. S.) 3.031 9684
1 yard ⁻²	yd ⁻²	$1.19599 \times 10^{-4} \text{ cm}^{-2}$	(U. S.) 4.077 7258
1 mile ⁻²	mi ⁻²	0.38610 km ⁻²	(U. S.) 1.586 7005
18. Volume [l^3] or [v]			
1 liter	l	1000.027 cm ³	3.000 0117
1 cubic inch	in ³	16.387 cm ³	(U. S.) 1.214 5038
1 cubic foot	ft ³	$2.8317 \times 10^4 \text{ cm}^3$	(U. S.) 4.452 0474
1 cubic yard	yd ³	$7.6456 \times 10^5 \text{ cm}^3$	(U. S.) 5.883 4112
1 gallon (U. S.)	gal	$3.7854 \times 10^3 \text{ cm}^3$	3.578 1157
1 gallon (British)	gal	$4.5461 \times 10^3 \text{ cm}^3$	3.657 6376
1 bushel (U. S.)	bu	$3.5239 \times 10^4 \text{ cm}^3$	4.547 0271
1 bushel (British)	bu	$3.6369 \times 10^4 \text{ cm}^3$	4.560 7276
1 quart, dry (U. S.)	qt	1101.23 cm ³	3.041 8771
1 quart, liquid (U. S.)	qt	946.358 cm ³	2.976 0557
1 quart (British)	qt	1136.521 cm ³	3.055 5776
1 fluid ounce (U. S.)	fl oz	29.5737 cm ³	1.470 9057
1 fluid ounce (British)	fl oz	28.4130 cm ³	1.453 5176
19. Volume ⁻¹ [l^{-3}] or [v^{-1}]			
1 liter ⁻¹	l ⁻¹	$9.9997 \times 10^{-4} \text{ cm}^{-3}$	4.999 9883
1 inch ⁻³	in ⁻³	$6.1023 \times 10^{-2} \text{ cm}^{-3}$	(U. S.) 2.785 4962
1 foot ⁻³	ft ⁻³	$3.5314 \times 10^{-5} \text{ cm}^{-3}$	(U. S.) 5.547 9526
1 yard ⁻³	yd ⁻³	1.3079 m ⁻³	(U. S.) 0.116 5888
1 gallon ⁻¹ (U. S.)	gal ⁻¹	$2.6417 \times 10^{-4} \text{ cm}^{-3}$	4.421 8843
1 gallon ⁻¹ (British)	gal ⁻¹	$2.1997 \times 10^{-4} \text{ cm}^{-3}$	4.342 3624
1 quart ⁻¹ , dry (U. S.)	qt ⁻¹	$9.0808 \times 10^{-4} \text{ cm}^{-3}$	4.958 1229
1 quart ⁻¹ , liquid (U. S.)	qt ⁻¹	$1.0567 \times 10^{-3} \text{ cm}^{-3}$	3.023 9443
1 quart ⁻¹ (British)	qt ⁻¹	$8.7988 \times 10^{-4} \text{ cm}^{-3}$	4.944 4224
1 (fluid ounce) ⁻¹ (U. S.)	fl oz ⁻¹	$3.3814 \times 10^{-2} \text{ cm}^{-3}$	2.529 0943
1 (fluid ounce) ⁻¹ (British)	fl oz ⁻¹	$3.5195 \times 10^{-2} \text{ cm}^{-3}$	2.546 4824
20. Length Degree ⁻¹ [lT^{-1}]			
1 inch per °F	in/°F	4.5720 cm per °C	0.660 1071
1 foot per °F	ft/°F	54.864 cm per °C	1.739 2883
1 meter per °C	m/°C	100.00 cm per °C	2.000 0000
21. Mass ⁻¹ Degree ⁻¹ [$m^{-1}T^{-1}$]			
1 per gram °F	per gram °F	1.8000 per gram °C	0.255 2725
1 per pound °F	per pound °F	$3.9683 \times 10^{-3} \text{ per gram °C}$	3.598 6067
1 per pound °C	per pound °C	$2.2046 \times 10^{-3} \text{ per gram °C}$	3.343 3342
22. Area ⁻¹ Time ⁻¹ [$l^{-2}t^{-1}$]			
1 foot ⁻² second ⁻¹	ft ⁻² s ⁻¹	3.8750 cm ⁻² hr ⁻¹	(U. S.) 0.588 2709
1 foot ⁻² second ⁻¹	ft ⁻² s ⁻¹	$1.0764 \times 10^{-3} \text{ cm}^{-2} \text{ sec}^{-1}$	(U. S.) 3.031 9684
1 mile ⁻² second ⁻¹	mi ⁻² s ⁻¹	$1.2184 \times 10^{-3} \text{ cm}^{-2} \text{ yr}^{-1}$	(U. S.) 3.085 7951
1 meter ⁻² second ⁻¹	m ⁻² s ⁻¹	$3.600 \times 10^{-1} \text{ cm}^{-2} \text{ hr}^{-1}$	1.556 3025

CONVERSION FACTORS

23

CONVERSION FACTORS.—Continued

23. Velocity [l/t^{-1}]

1 foot per second	=	30 4801	cm sec ⁻¹	(U. S.) 1.484 0158
1 foot per minute	=	0 5080	cm sec ⁻¹	(U. S.) 1.705 8045
1 mile per hour	=	44 7041	cm sec ⁻¹	(U. S.) 1 050 3472
1 mile per minute	=	2.6822 × 10 ³	cm sec ⁻¹	(U. S.) 3 428 4984
1 meter per minute	=	1 6667	cm sec ⁻¹	0 221 8487
1 kilometer per hour	=	27 7778	cm sec ⁻¹	1.443 6975
Velocity of light	=	2 9986 × 10 ¹⁰	cm sec ⁻¹	10.476 0185

24. Acceleration [l/t^{-2}]

1 foot per second ²	=	30.480	cm sec ⁻²	(U. S.) 1.484 0158
1 mile per hour second	=	44 704	cm sec ⁻²	(U. S.) 1.050 3472
1 mile per hour minute	=	0 74507	cm sec ⁻²	(U. S.) 1.872 1959
1 meter per second ²	=	100 000	cm sec ⁻²	2 000 0000
1 kilometer per hour second	=	27 778	cm sec ⁻²	1 443 6975
Gravity, standard	=	980 665	cm sec ⁻²	2 991 5207
Gravity, standard	=	32 174	ft sec ⁻²	(U. S.) 1 507 5040

25. Angular Velocity [$θ/t^{-1}$]

1 revolution per day	=	7 2722 × 10 ⁻⁵	radian sec ⁻¹	5 861 0602
1 revolution per minute	=	1 0172 × 10 ⁻³	radian sec ⁻¹	1 020 0286
1 revolution per second	=	6 2832	radian sec ⁻¹	0.798 1799
1 degree per second	=	1 7453 × 10 ⁻²	radian sec ⁻¹	2 241 8774

26. Angular Acceleration [$θ/t^{-2}$]

1 revolution per second ²	=	6 2832	radian sec ⁻²	0.798 1799
1 revolution per minute ²	=	1.7153 × 10 ⁻³	radian sec ⁻²	3.241 8773
1 revolution per minute second	=	0 10120	radian sec ⁻²	1 020 0286

27. Twist; Rotatory Power [$θ/l^{-1}$]

1 degree per inch	=	6 8714 × 10 ⁻³	radian cm ⁻¹	(U. S.) 3.837 0428
1 degree per foot	=	5 7261 × 10 ⁻⁴	radian cm ⁻¹	(U. S.) 4.757 8616
1 degree per centimeter	=	1 7453 × 10 ⁻²	radian cm ⁻¹	2 241 8774
1 minute per centimeter	=	2 9089 × 10 ⁻⁴	radian cm ⁻¹	4 403 7261

28. Density; Volume Concentration; Solubility (Non-gases) [ml^{-3}] or [mw^{-1}] (See also Hydrometer Tables, p. 31)

1 gram per milliliter*	=	0 999973	g cm ⁻³	1 999 9883
1 pound per inch ³	=	27 680	g cm ⁻³	(U. S.) 1 442 1621
1 pound per foot ³	=	0 016018	g cm ⁻³	(U. S.) 2 204 6183
1 pound per gallon (U. S.)	=	0 119826	g cm ⁻³	1 078 5502
1 pound per gallon (British)	=	0 099776	g cm ⁻³	2 999 0282
1 slug per foot ³ (g.)	=	0 5154	g cm ⁻³	(U. S.) 1 712 1233
Mercury† at 0°C	=	15 5951	g cm ⁻³	1 192 9882

* Numerically equal to specific gravity $t^{\circ} F^{\circ}$ † Internationally accepted conventional value to be used in expressing pressures in terms of columns of mercury.

29. Mass Concentration [$m_1m_2^{-1}$]

(This quantity involves two distinct units of mass; when the two units are the same, the concentration is called the "titer," or is denoted as a per cent.)

1 gram per ton (2000 pound)	=	1 1023	mg per kilogram	0.042 3042
1 gram per ton (2240 pound)	=	0 9812	mg per kilogram	1.993 0862
1 milligram per assay ton	=	*34.286	mg per kilogram	1 535 1132
1 ounce (av.) per ton (2000 lb.)	=	31 2500	mg per kilogram	1.494 8500
1 ounce (av.) per ton (2240 lb.)	=	27 9018	mg per kilogram	1.445 6320
1 pound (av.) per ton (2000 lb.)	=	500 000	mg per kilogram	2 698 9700
1 pound (av.) per ton (2240 lb.)	=	446 429	mg per kilogram	2 649 7520
1 gram per ton (metric)	=	1 0000	mg per kilogram	0.000 0000
1 karat†	=	41 667	mg per gram	1 619 7888

* Equals one troy ounce per 2000 lb. av † 1 of gold to 24 of mixture

30. Force [mlt^{-2}]

1 gram weight (g.)	=	980 665	dyne	2 991 5207
1 poundal	=	1.3825 × 10 ⁴	dyne	(U. S.) 4.140 6816
1 pound weight (g.)	=	4.4482 × 10 ⁵	dyne	5 648 1864
1 ton weight (2000 lb.) (g.)	=	8.8964 × 10 ⁶	dyne	8.949 2164
1 ton weight (2240 lb.) (g.)	=	9 9640 × 10 ⁶	dyne	8 998 4344

CONVERSION FACTORS.—Continued

31. Force⁻¹ [$m^{-1}l^{-1}t^2$]

1 (gram weight) ⁻¹ (g.)	=	1 0917 × 10 ⁻³ dyne ⁻¹	3.008 4793
1 poundal ⁻¹	=	7 2330 × 10 ⁻³ dyne ⁻¹	5.859 3184
1 (pound weight) ⁻¹ (g.)	=	2.2481 × 10 ⁻³ dyne ⁻¹	6.351 8136

32. Torque; Moment of a Force [ml^2t^{-2}]

1 pound-foot (g.)	=	1 3558 × 10 ⁷ dyne cm	(U. S.) 7 132 2022
1 pound-inch (g.)	=	1 1298 × 10 ⁶ dyne cm	(U. S.) 6.053 0210
1 kilogram-meter (g.)	=	9.8066 × 10 ⁷ dyne cm	7.991 5207
1 poundal-foot	=	4 2140 × 10 ⁶ dyne cm	(U. S.) 5.624 6974

33. Stress; Pressure; Tension; Young's Modulus; Modulus of Rigidity; Modulus of Compression; Bulk Modulus; Coefficient of Skin Friction [$ml^{-1}t^{-2}$]

1 barye	=	1 0000 dyne cm ⁻²	0.000 0000
1 bar	=	*1 0000 × 10 ⁶ dyne cm ⁻²	6.000 0000
1 gram weight per cm ² (g.)	=	980 665 dyne cm ⁻²	2.991 5207
1 kilogram weight per m ² (g.)	=	98 0665 dyne cm ⁻²	1.991 5207
1 kilogram weight per mm ² (g.)	=	9 8066 × 10 ⁷ dyne cm ⁻²	7.991 5207
1 pound weight per in. ² (g.)	=	6 8947 × 10 ⁴ dyne cm ⁻²	(U. S.) 4.838 5173
1 pound weight per ft. ² (g.)	=	4 7880 × 10 ² dyne cm ⁻²	(U. S.) 2.680 1548
1 ton (2000 lb.) weight per in. ² (g.)	=	1.3789 × 10 ⁶ dyne cm ⁻²	(U. S.) 8.139 5473
1 ton (2240 lb.) weight per in. ² (g.)	=	1 5444 × 10 ⁶ dyne cm ⁻²	(U. S.) 8 188 7653
1 ton (2000 lb.) weight per ft. ² (g.)	=	9.5760 × 10 ⁴ dyne cm ⁻²	(U. S.) 5.981 1848
1 ton (2240 lb.) weight per ft. ² (g.)	=	10 7251 × 10 ⁴ dyne cm ⁻²	(U. S.) 6 030 4028
1 centimeter of water at 4°C (g.)	=	9.80638 × 10 ² dyne cm ⁻²	2.991 5090
1 inch of water at 4°C (g.)	=	2.49082 × 10 ³ dyne cm ⁻²	(U. S.) 3.396 3436
1 centimeter of mercury at 0°C (g.)	=	1 33322 × 10 ⁴ dyne cm ⁻²	4 124 9031
1 inch of mercury at 0°C (g.)	=	3.38639 × 10 ⁴ dyne cm ⁻²	(U. S.) 4 529 7377
1 normal atmosphere (g.)	=	1 01325 × 10 ⁶ dyne cm ⁻²	6 005 7166

* This value accords with the only internationally accepted use of this term, but "bar" has also been used to denote a pressure of one dyne per cm².

34. Stress⁻¹; Compressibility [$m^{-1}l^2$]

1 centimeter ³ per gram weight (g.)	=	1 0197 × 10 ⁻³ cm ² dyne ⁻¹	3 008 4793
1 centimeter ³ per kilogram weight (g.)	=	1 0197 × 10 ⁻⁶ cm ² dyne ⁻¹	6 008 4793
1 millimeter ³ per kilogram weight (g.)	=	1 0197 × 10 ⁻⁶ cm ² dyne ⁻¹	6 008 4793
1 inch ³ per pound weight (g.)	=	1 4504 × 10 ⁻⁶ cm ² dyne ⁻¹	(U. S.) 5.161 4827
1 inch ³ per ton weight (2000 lb.) (g.)	=	7 2519 × 10 ⁻⁹ cm ² dyne ⁻¹	(U. S.) 6.860 4527
1 inch ³ per ton weight (2240 lb.) (g.)	=	6.4749 × 10 ⁻⁹ cm ² dyne ⁻¹	(U. S.) 9 811 2347
1 foot ³ per pound weight (g.)	=	2.0886 × 10 ⁻³ cm ² dyne ⁻¹	(U. S.) 3 319 8452
1 (centimeter of water at 4°C) ⁻¹ (g.)	=	1 0197 × 10 ⁻³ cm ² dyne ⁻¹	3 008 4910
1 (inch of water at 4°C) ⁻¹ (g.)	=	4.0147 × 10 ⁻⁴ cm ² dyne ⁻¹	(U. S.) 4 603 6564
1 (centimeter of mercury at 0°C) ⁻¹ (g.)	=	7.5006 × 10 ⁻⁵ cm ² dyne ⁻¹	5.875 0969
1 (inch of mercury at 0°C) ⁻¹ (g.)	=	2 9530 × 10 ⁻⁵ cm ² dyne ⁻¹	(U. S.) 5 470 2623
1 (normal atmosphere) ⁻¹ (g.)	=	9.8692 × 10 ⁻⁷ cm ² dyne ⁻¹	7 994 2831

35. Work; Energy; Heat [ml^2t^{-2}]

1 centimeter-dyne	=	1 0000 erg	0 000 0000
1 joule (absolute)	=	1 0000 × 10 ⁷ erg	7.000 0000
1 joule (International) (v)	=	1 00032 joule (abs.)	0 000 1300
1 meter-kilogram (g.)	=	9 80665 joule (abs.)	0.991 5207
1 foot-pound (g.)	=	1 35582 joule (abs.)	(U. S.) 0.132 2022
1 liter-atmosphere (normal) (g.)	=	101.328 joule (abs.)	2.005 7283
1 liter-atmosphere (45° lat.)	=	*101 323 joule (abs.)	2.005 7067
1 cubic centimeter-atmosphere (normal) (g.)	=	0 101325 joule (abs.)	1.005 7166
1 horse-power hour (HP hr.) (g.)	=	2 6845 × 10 ⁶ joule (abs.)	(U. S.) 6.428 8674
1 horse-power hour (electrical, U. S., British)	=	2 6856 × 10 ⁶ joule (abs.)	6 429 0413
1 cheval-vapeur heure (g.)	=	2 6478 × 10 ⁶ joule (abs.)	6 422 8845
1 kilowatt-hour (abs.)	=	3.6000 × 10 ⁶ joule (abs.)	6 556 3025
1 International volt (v) faraday	=	9.6541 × 10 ⁴ joule (abs.)	4 984 7097
1 International volt (v) electronic charge	=	1 5927 × 10 ⁻¹⁹ joule (abs.)	19.202 1463
1 gram calorie (20°C)	=	4 181 joule (abs.)	0.621 2802
1 gram calorie (15°C)	=	4 185 joule (abs.)	0.621 6955
1 gram calorie (mean)	=	4 186 joule (abs.)	0.621 7992
1 British Thermal Unit (39°F)	=	1060 4 joule (abs.)	3 025 4697
1 British Thermal Unit (mean)	=	1054 8 joule (abs.)	3.023 1701
1 British Thermal Unit (60°F)	=	1054 6 joule (abs.)	3.023 0878
1 Centigrade Thermal Unit (15°C)	=	1 8983 × 10 ³ joule (abs.)	3.278 3613

* g₀ = 980 616 cm sec⁻².

CONVERSION FACTORS

25

CONVERSION FACTORS.—Continued

36. Power [ml^2t^{-1}]

1 watt (absolute)	=	1.0000 $\times 10^7$ erg sec ⁻¹	7.000 0000
1 watt (International) (v)	=	1.00032 watt (abs.)	0.000 1390
1 meter-kilogram per second (g_s)	=	9.80665 watt (abs.)	0.991 5207
1 foot-pound per second (g_s)	=	1.35582 watt (abs.)	(U. S.) 0.132 2022
1 horsepower, electrical (U. S., British)	=	*746.00 watt (abs.)	2.872 7388
1 horsepower, electrical (Continental Europe)	=	*736.00 watt (abs.)	2.866 0778
1 horsepower (HP) (g_s)	=	†745.70 watt (abs.)	2.872 6649
1 cheval-vapeur (g_s)	=	735.499 watt (abs.)	2.866 5820

* Defined in terms of the watt, commonly used in rating electrical machinery. † Defined as 550 ft. lb. per sec

37. Action [ml^2t^{-1}]

1 Planck's quantum	=	6.554 $\times 10^{-27}$ erg sec	27.816 5064
1 volt electronic-charge second	=	2.4292 $\times 10^{14}$ quanta	14.385 4575
1 volt faraday second	=	1.4721 $\times 10^{18}$ quanta	38.168 0209
1 joule second	=	1.5258 $\times 10^{18}$ quanta	33.183 4936
1 calorie (15°C) second	=	6.3854 $\times 10^{18}$ quanta	33.805 1891
1 joule second/ N_0 *	=	2.5173 $\times 10^9$ quanta	9.400 9302
1 calorie (15°C) second/ N_0 *	=	1.0535 $\times 10^{10}$ quanta	10.022 6257

* N_0 denotes Avogadro's number, the number of molecules per gram mole

38. Fluidity [$m^{-4}t$] (See also 39)

1 rhe	=	1.0000 poise ⁻¹	0.000 0000
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39. Viscosity [$ml^{-1}t^{-1}$]

1 poise	=	1.000 gram cm ⁻¹ sec ⁻¹	0.000 0000
1 gram weight sec cm ⁻² (g_s)	=	980.665 poise	2.991 5207
1 pound weight sec inch ⁻² (g_s)	=	6.895 $\times 10^4$ poise	(U. S.) 4.838 5173
1 pound weight sec foot ⁻² (g_s)	=	4.788 $\times 10^5$ poise	(U. S.) 2.680 1548

40. Kinematic Viscosity [l^2t^{-1}]

1 poise centimeter ² gram ⁻¹	=	1.000 cm ² sec ⁻¹	0.000 0000
1 poise inch ² gram ⁻¹	=	16.387 cm ² sec ⁻¹	1.214 5038
1 inch ² second ⁻¹	=	6.451 cm ² sec ⁻¹	(U. S.) 0.809 6692
1 poise foot ² pound ⁻¹	=	62.43 cm ² sec ⁻¹	(U. S.) 1.795 3817

41. Diffusivity; Diffusion, Coefficient of [l^2t^{-1}]

All quantities of the thing diffusing are to be expressed in terms of the same units. Heat diffusivity is numerically equal to heat conductivity divided by the product of the density times the heat capacity (per unit of mass); all must be expressed in the same system of units.

1 liter centimeter ⁻¹ day ⁻¹	=	1.1574 $\times 10^{-3}$ cm ² sec ⁻¹	2.063 4980
1 centimeter ² day ⁻¹	=	1.1574 $\times 10^{-8}$ cm ² sec ⁻¹	3.063 4863
1 inch ² sec ⁻¹	=	6.4516 cm ² sec ⁻¹	(U. S.) 0.809 6692

42. Surface Tension [mt^{-1}] (See also Capillary Constant, Table 43)

1 milligram weight per mm (g_s)	=	9.80665 dyne cm ⁻¹	0.991 5207
1 milligram weight per inch (g_s)	=	0.38609 dyne cm ⁻¹	(U. S.) 1.586 6861
1 erg per centimeter ²	=	1.00000 dyne cm ⁻¹	0.000 0000
1 erg per millimeter ²	=	100.00000 dyne cm ⁻¹	2.000 0000

43. (Capillary Constant)² [l^2]

The term "Capillary Constant" is used in two different senses; viz., either to denote $a_1 = \sqrt{\gamma/\rho g}$, or to denote $a_2 = \sqrt{2\gamma/\rho g}$. English authors generally follow the former practice, and German authors the latter; neither use the subscript. γ denotes the surface tension, g the acceleration of gravity, and ρ the positive difference in the densities of the adjacent fluids.

1 inch ²	=	6.451 cm ²	0.809 6692
1 millimeter ² (a_1) ² (g_s)	=	*9.807 dyne cm ⁻¹ per (g cm ⁻³)	0.991 5207
1 millimeter ² (a_2) ² (g_s)	=	*4.903 dyne cm ⁻¹ per (g cm ⁻³)	0.690 4907
1 inch ² (a_1) ² (g_s)	=	*6.327 $\times 10^3$ dyne cm ⁻¹ per (g cm ⁻³)	(U. S.) 3.801 1899
1 inch ² (a_2) ² (g_s)	=	*3.163 $\times 10^3$ dyne cm ⁻¹ per (g cm ⁻³)	(U. S.) 3.500 1599

* To convert a' , when referred to g_s , to surface tension in dynes per cm, multiply a' by the factor given in this table and by the difference in the densities (gram per cm³) of the adjacent fluids, if a' is referred to g , multiply the resulting product by ρ/g .

44. Thermal Conductivity [$T^{-1}mlt^{-1}$]

The dimensions practically employed in expressing this property are (Heat Area⁻¹ Time⁻¹ per Degree Length⁻¹). Other conversion factors may be obtained by combining those of Tables 35 (Heat), 22 (Area⁻¹ Time⁻¹) and 20 (Length Degree⁻¹).

1 calorie (15°) cm ⁻² sec ⁻¹ (°C, cm ⁻¹) ⁻¹	=	4.185 joules (abs.) cm ⁻² sec ⁻¹ (°C, cm ⁻¹) ⁻¹	0.621 6955
1 calorie (20°) cm ⁻² sec ⁻¹ (°C, cm ⁻¹) ⁻¹	=	4.181 joules (abs.) cm ⁻² sec ⁻¹ (°C, cm ⁻¹) ⁻¹	0.621 2802

INTERNATIONAL CRITICAL TABLES

CONVERSION FACTORS.—Continued

44. Thermal Conductivity [$T^{-1}ml^{-1}$].—Continued

1 British Thermal Unit (39°F) $ft.^{-2} sec^{-1} (^{\circ}F, in.^{-1})^{-1} =$	5.218 joules (abs.) $cm^{-2} sec^{-1} (^{\circ}C, cm^{-1})^{-1}$	0.717 5452
1 British Thermal Unit (mean) $ft.^{-2} sec^{-1} (^{\circ}F, in.^{-1})^{-1} =$	5.191 joules (abs.) $cm^{-2} sec^{-1} (^{\circ}C, cm^{-1})^{-1}$	0.715 2456
1 British Thermal Unit (60°F) $ft.^{-2} sec^{-1} (^{\circ}F, in.^{-1})^{-1} =$	5.190 joules (abs.) $cm^{-2} sec^{-1} (^{\circ}C, cm^{-1})^{-1}$	0.715 1633

45. Intensity of Radiation [mt^{-2}] or [ml^{-2}]

The dimensions depend upon the point of view, when the receptor is considered, they are [Energy, Area⁻¹, Time⁻¹]; when the radiation itself is considered they are [Energy, Volume⁻¹]. Conversion from one to the other involves the velocity of propagation, if this is the velocity of light in vacuo, the factors are as given below, if the velocity is c cm sec⁻¹, the factors given must be multiplied by $c/(2.9986 \times 10^{10})$. For other units, combine these factors with those of Tables 19 (Volume⁻¹), 22 (Area⁻¹ Time⁻¹), and 35 (Energy).

1 erg cm ⁻²	$=$	2.9986×10^{10} erg cm ⁻² sec ⁻¹	10 476 9185
1 foot-pound ft ⁻² (g.)	$=$	1.4357×10^{13} erg cm ⁻² sec ⁻¹	(U. S.) 13.157 0733

46. Luminous Intensity of a Source in a Given Direction [$\psi\omega^{-1}$]

By definition of the lumen, a source of one spherical candle power emits $4\pi (= 12.566)$ lumens. (See also Photometric Standards, in another section (consult index).)

1 candle, International	$=$	1 0000 Int. lumen per steradian	0.000 0000
1 pentane candle	$=$	1 0 Int. candle	
1 Hefner unit	$=$	0.90 Int. candle	
1 Carcel unit	$=$	9.6 Int. candle	Approximate
1 bougie decimale	$=$	1 0 Int. candle	
1 English sperm candle	$=$	1 0 Int. candle	

47. Illumination of a Surface [ψl^{-2}]

1 lux	$=$	1 000 lumen meter ⁻²	0 000 0000
1 meter-candle	$=$	1 000 lumen meter ⁻²	0 000 0000
1 phot	$=$	1.000×10^4 lumen meter ⁻²	4 000 0000
1 foot-candle	$=$	10 764 lumen meter ⁻²	(U. S.) 1 031 9684
1 lumen foot ⁻²	$=$	10 764 lumen meter ⁻²	(U. S.) 1 031 9684

48. Surface Brightness [$\psi l^{-2}\omega^{-1}$]

1 lumen centimeter ⁻² steradian ⁻¹	$=$	1 0000 lambert	0 000 0000
1 lumen foot ⁻² steradian ⁻¹	$=$	1 0764 millilambert	(U. S.) 0 031 9684
1 candle centimeter ⁻²	$=$	3.1416×10^3 millilambert	3 497 1499
1 candle inch ⁻²	$=$	4.8695×10^2 millilambert	(U. S.) 2 687 4807

49. Electrical Quantity; Charge; Total Electric Displacement; Flux of Induction [$e^1 m^1 l^1 t^{-1}$]; [$\mu^{-1} m^1 l^1$]

1 absolute coulomb	$=$	1 00010 Int. coulomb (v)	0.000 0434
1 absolute coulomb	$=$	1 00007 Int. coulomb (a)	0 000 0301
1 International coulomb (v)	$=$	0.99990 abs. coulomb	1.999 9566
1 International coulomb (a)	$=$	0.99993 abs. coulomb	1.999 9696
1 egsm unit	$=$	10 0000 abs. coulomb	1.000 0000
1 egsm unit	$=$	2.9986×10^{10} egse unit	10 476 9185
1 egse unit	$=$	3.3349×10^{-10} abs. coulomb	10.523 0815
1 fpsm unit	$=$	1.1758×10^2 egsm unit	2 070 3408
1 fpse unit	$=$	3.5839×10^3 egse unit	3.554 3560
1 fpse unit	$=$	1.1952×10^{-6} abs. coulomb	6 077 4381
1 ampere-hour (abs.)	$=$	3.6000×10^3 abs. coulomb	3 556 3025
1 electronic charge	$=$	1.5921×10^{-19} abs. coulomb	19 201 9639
1 electronic charge	$=$	4.771×10^{-10} egse unit	10 678 8824
1 faraday	$=$	9.6500×10^4 abs. coulomb	4 984 5273
1 faraday	$=$	9.6510×10^4 Int. coulomb (v)	4.984 5707
1 faraday	$=$	9.6507×10^4 Int. coulomb (a)	4.984 5577
1 faraday	$=$	2.89365×10^{14} egse unit	14 461 4458

* Value of c : experimental value $= 2.9979 \times 10^{10}$ (Rosa and Dorsey, *Bull. U. S. Bur. Standards*, 3: 433, 07)

50. Electrical Quantity⁻¹; Charge⁻¹; Total Electric Displacement⁻¹; Flux of Induction⁻¹ [$e^{-1} m^{-1} l^{-1} t$]; [$\mu^1 m^{-1} l^{-1}$]

1 absolute coulomb ⁻¹	$=$	0.99990 Int. coulomb ⁻¹ (v)	1 999 9566
1 absolute coulomb ⁻¹	$=$	0.99993 Int. coulomb ⁻¹ (a)	1 999 9696
1 egsm unit ⁻¹	$=$	0.10000 abs. coulomb ⁻¹	1.000 0000
1 egse unit ⁻¹	$=$	2.9986×10^9 abs. coulomb ⁻¹	9 476 9185
1 ampere-hour ⁻¹	$=$	2.7778×10^{-4} abs. coulomb ⁻¹	4.443 6975
1 faraday ⁻¹	$=$	1.0363×10^{-4} abs. coulomb ⁻¹	5.015 4727
1 electronic charge ⁻¹	$=$	6.281×10^{18} abs. coulomb ⁻¹	18 798 0361

CONVERSION FACTORS.—Continued

51. Electrical Current [$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}t^{-1}$]; [$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}t^{-1}$]

absolute ampere	=	1 00010	Int. ampere (v)	0.000 0434
absolute ampere	=	1 00007	Int. ampere (a)	0.000 0804
International ampere (v)	=	0 99990	abs. ampere	1.999 9566
International ampere (a)	=	0 99993	abs. ampere	1.999 9696
cgsu unit	=	10 0000	abs. ampere	1 000 0000
cgse unit	=	$3\ 3349 \times 10^{-10}$	abs. ampere	10.523 0815
faraday second ⁻¹	=	$9\ 6500 \times 10^4$	abs. ampere	4.984 5273
International ampere (U. S. before 1911)	=	0 99916	Int. ampere (v)	1.999 0353
International ampere (England before 1906)	=	0 99870	Int. ampere (v)	1.999 4358
International ampere (England 1906-8)	=	0 99894	Int. ampere (v)	1.999 5399
International ampere (England 1909-10)	=	0 99990	Int. ampere (v)	1.999 9566
International ampere (France before 1911)	=	0 99998	Int. ampere (v)	1.999 9131
International ampere (Germany before 1911)	=	0 99968	Int. ampere (v)	1.999 8610

52. Electrical Potential [$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}t^{-1}$]; [$\mu^{\frac{1}{2}}m^{\frac{1}{2}}t^{-2}$]

absolute volt	=	0 99958	Int. volt (v)	1.999 8176
absolute volt	=	0 99955	Int. volt (a)	1.999 8046
International volt (v)	=	1 00042	abs. volt	0.000 1824
International volt (a)	=	1 00045	abs. volt	0.000 1954
cgsu unit	=	$1\ 0000 \times 10^{-8}$	abs. volt	8.000 0000
cgse unit	=	299 86	abs. volt	2.476 9185
International volt (U. S. before 1911)	=	0 99916	Int. volt (v)	1.999 0353
International volt (England before 1906)	=	0 99870	Int. volt (v)	1.999 4358
International volt (England 1906-8)	=	0 99894	Int. volt (v)	1.999 5399
International volt (England 1909-10)	=	0 99990	Int. volt (v)	1.999 9566
International volt (Germany and France, before 1911)	=	0 99968	Int. volt (v)	1 999 8610

53. Electrical Field Strength; Potential Gradient; Dielectric Strength [$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}t^{-1}$]; [$\mu^{\frac{1}{2}}m^{\frac{1}{2}}t^{-2}$]

cgsu centimeter ⁻¹	=	$1\ 0000 \times 10^{-8}$	abs. volt cm ⁻¹	8 000 0000
cgsu inch ⁻¹	=	$3\ 9370 \times 10^{-9}$	abs. volt cm ⁻¹	(U. S.) 9 595 1654
cgse centimeter ⁻¹	=	$2\ 9986 \times 10^3$	abs. volt cm ⁻¹	2 476 9185
cgse inch ⁻¹	=	$1\ 1805 \times 10^2$	abs. volt cm ⁻¹	(U. S.) 2 072 0839
volt inch ⁻¹	=	$3\ 9370 \times 10^{-1}$	volt cm ⁻¹	(U. S.) 1 595 1654

54. Electrical Resistance; Surface Resistivity [$\epsilon^{-\frac{1}{2}}t^{-1}$]; [μt^{-1}]

1 absolute ohm	=	0 99948	Int. ohm	1 999 7741
1 International ohm	=	1 00052	abs. ohm	0.000 2259
1 cgsu unit	=	$1\ 0000 \times 10^{-9}$	abs. ohm	9.000 0000
1 cgse unit	=	$8\ 9916 \times 10^{11}$	abs. ohm	11.953 8370
1 International ohm (France before 1911)	=	0 99999	Int. ohm	1.999 9506
1 Board of Trade unit (England 1903)	=	0 99984	Int. ohm	1.999 9306
1 B. A. unit	=	0 98660	Int. ohm	1 994 1420
1 "Legal ohm" of 1884 (England)	=	0 99718	Int. ohm	1 998 7727
1 Siemens unit	=	0 91073	Int. ohm	1.973 4667

55. Electrical Inductance [$\epsilon^{-\frac{1}{2}}t^2$]; [μl]

1 absolute henry	=	0 99948	Int. henry	1 999 7741
1 International henry	=	1.00052	abs. henry	0.000 2259
1 cgsu unit*	=	$1\ 0000 \times 10^{-9}$	abs. henry	9.000 0000
1 cgse unit	=	$8\ 9916 \times 10^{11}$	abs. henry	11.953 8370

* Occasionally called a centimeter

56. Electrical Capacity [ϵl]; [$\mu^{-1}t^{-2}$]

1 absolute farad	=	1 00052	Int. farad	0.000 2259
1 International farad	=	0 99948	abs. farad	1.999 7741
1 cgsu unit	=	$1\ 0000 \times 10^9$	abs. farad	9.000 0000
1 cgse unit*	=	$1\ 1121 \times 10^{-12}$	abs. farad	12.046 1630
1 cgsu unit	=	$8\ 9916 \times 10^{20}$	cgse unit	20.953 8370
1 absolute farad	=	$8\ 9916 \times 10^{11}$	cgse unit	11.953 8370

* Frequently called a centimeter

57. Electrical Volume Resistivity [$\epsilon^{-1}t$]; [μt^{-1}]

1 absolute ohm-centimeter	=	0.99948	Int. ohm-cm	1.999 7741
1 International ohm-centimeter	=	1.00052	abs. ohm-cm	0.000 2259
1 cgsu unit	=	9.9948×10^{-10}	Int. ohm-cm	10.999 7741
1 cgse unit	=	8.9869×10^{11}	Int. ohm-cm	11.953 6111

CONVERSION FACTORS.—Continued

57. Electrical Volume Resistivity [$\epsilon^{-1}l$]; [μl^{-1}].—Continued

1 microhm-centimeter	=	1.0000 $\times 10^{-8}$ ohm-cm	6.000 0000
1 microhm-inch	=	2.5400 microhm-cm	(U. S.) 0.404 8346
1 ohm-inch	=	2.5400 $\times 10^6$ microhm-cm	(U. S.) 6.404 8346
1 ohm (meter, millimeter) [†]	=	100.0000 microhm-cm	2.000 0000
1 ohm (meter, millimeter)	=	78.540 microhm-cm	1.895 0899
1 ohm (mil, foot)	=	1.6624 $\times 10^{-1}$ microhm-cm	(U. S.) 1.220 7433
International Annealed Copper Standard (20°C)	=	1.7241 microhm-cm	0.236 5720

58. Volume Conductivity [$\epsilon^{-1}l^{-1}$]; [$\mu^{-1}l^{-1}$]

1 absolute ϵ^{-1} ohm ⁻¹ -centimeter ⁻¹	=	1 00052 Int. ϵ^{-1} ohm ⁻¹ cm ⁻¹	0.000 2259
1 International ohm ⁻¹ -centimeter ⁻¹	=	0 99948 abs. ohm ⁻¹ cm ⁻¹	1.999 7741
1 cgs _m unit	=	1 00052 $\times 10^9$ Int. ohm ⁻¹ cm ⁻¹	9.000 2259
1 cgs _e unit	=	1.11273 $\times 10^{-12}$ Int. ohm ⁻¹ cm ⁻¹	12.046 3889
1 microhm ⁻¹ -centimeter ⁻¹	=	1.0000 $\times 10^8$ ohm ⁻¹ cm ⁻¹	6.000 0000
1 microhm ⁻¹ -inch ⁻¹	=	3 9370 $\times 10^{-1}$ microhm ⁻¹ cm ⁻¹	(U. S.) 1.595 1654
1 ohm ⁻¹ -inch ⁻¹	=	3 9370 $\times 10^{-7}$ microhm ⁻¹ cm ⁻¹	(U. S.) 7.595 1654
1 ohm ⁻¹ (meter, millimeter) [†] -1	=	1.000 $\times 10^{-3}$ microhm ⁻¹ cm ⁻¹	2.000 0000
1 ohm ⁻¹ (meter, millimeter) ⁻¹	=	1.2732 $\times 10^{-3}$ microhm ⁻¹ cm ⁻¹	2.104 9101
1 ohm ⁻¹ (mil, foot) ⁻¹	=	6 0153 microhm ⁻¹ cm ⁻¹	(U. S.) 0.779 2587
International Annealed Copper Standard (20°C)	=	0 5800 microhm ⁻¹ cm ⁻¹	1.763 4280
100% conductivity (20°C)	=	0 5800 microhm ⁻¹ cm ⁻¹	1.763 4280

* "Mho" is occasionally used instead of ohm⁻¹.59. Electrical Mass Resistivity [$\epsilon^{-1}ml^{-1}$]; [$\mu ml^{-1}l^{-1}$]

1 absolute ohm (meter, gram)	=	0 99948 Int. ohm (meter, gram)	1.999 7741
1 International ohm (meter, gram)	=	1.00052 abs. ohm (meter, gram)	0.000 2259
1 cgs _m unit	=	9 9948 $\times 10^{-6}$ Int. ohm (meter, gram)	6.999 7741
1 cgs _e unit	=	8 9869 $\times 10^{14}$ Int. ohm (meter, gram)	15.953 6111
1 ohm (mile, pound)	=	1 7513 $\times 10^{-6}$ ohm (meter, gram)	(U. S.) 4.243 3663
1 ohm (centimeter, gram)	=	1.0000 $\times 10^4$ ohm (meter, gram)	4.000 0000
1 ohm (centimeter, gram)	=	D* ohm-cm	
† International Annealed Copper Standard at 20°C	=	0 15328 ohm (meter, gram)	1.185 4738

* D represents the density in grams per centimeter³.† Density = 8.89 grams per centimeter³. See Table 6160. Electrical Mass Conductivity [$\epsilon m^{-1}l^{-1}$]; [$\mu^{-1}m^{-1}l^{-1}$]

1 absolute ohm ⁻¹ (meter, gram)	=	1.00052 Int. ohm ⁻¹ (meter, gram)	0.000 2259
1 International ohm ⁻¹ (meter, gram)	=	0 99948 abs. ohm ⁻¹ (meter, gram)	1.999 7741
1 cgs _m unit ⁻¹	=	1 00052 $\times 10^5$ Int. ohm ⁻¹ (meter, gram)	5.000 2259
1 cgs _e unit ⁻¹	=	1 1127 $\times 10^{-16}$ Int. ohm ⁻¹ (meter, gram)	16.046 3889
1 ohm ⁻¹ (mile, pound)	=	5.7100 $\times 10^{-3}$ ohm ⁻¹ (meter, gram)	3.756 6337
1 ohm ⁻¹ (centimeter, gram)	=	1.0000 $\times 10^{-4}$ ohm ⁻¹ (meter, gram)	4.000 0000
1 ohm ⁻¹ (centimeter, gram)	=	*D ⁻¹ (ohm-centimeter) ⁻¹	

* D⁻¹ = reciprocal of the density in grams per centimeter³.

61. Constants of Annealed Copper as Accepted at Various Times

Data taken from U. S. Bur. Standards Circular No. 31

Temperature °C	England (Eng. Stds. Com. 1904)	Germany (Old "Nor- mal Kupfer" density = 8.91)	Germany (Old "Nor- mal Kupfer" assuming density 8.89)	Lindeck, Matthiessen, assuming density 8.89	A. I. E. E. before 1907 (Matthies- sen value)	A. I. E. E. 1907 to 1910	Bureau Standards and A. I. E. E. 1911	Inter. Annealed Copper Standard 1913
Resistivity in ohms (meter, grams)								
0	0.141362	0.139590	0.139277	0.141571	0.141729	0.141728	0.141068	0.141332
15	0.150137	0.148602	0.148164	0.149974	0.150141	0.150658	0.150034	0.150290
15.6	0.1508							
20	0.153463	0.151470	0.151130	0.152851	0.153022	0.153634	0.153022	0.15328
25	0.156488	0.154440	0.154098	0.155765	0.155938	0.156610	0.156010	0.156262
Temperature coefficient of resistance (mass constant)								
0	0.00428	0.004255	0.004255	$\frac{1}{R_0} = \frac{1}{R_t} (1 - 3.8701t \times 10^{-3} + 9.0091t^2 \times 10^{-6})$	0.0042	0.004277	0.004277	0.004265
15	0.004022	0.004	0.004			0.003951	0.004019	0.004009
20	0.003943	0.003922	0.003922			0.003875	0.00394	0.00393
25	0.003866	0.003846	0.003846			0.003801	0.003864	0.003854
Density								
	8.89	8.91	(8.89)	(8.89)	8.89	8.89	8.89	8.89
	15.6°						20°	20°

CONVERSION FACTORS

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CONVERSION FACTORS.—Continued

62. Ionic Mobility [$\text{cm}^2 \text{sec}^{-1} \text{volt}^{-1}$]; [$\mu\text{m}^2 \text{V}^{-1} \text{sec}^{-1}$]

centimeter ² second ⁻¹ per cgse unit of potential	=	$3.3349 \times 10^{-9} \text{ cm}^2 \text{ sec}^{-1} \text{ volt}^{-1}$ (abs.)	3.523 0815
cm ² second ⁻¹ per cgse unit of potential	=	$2.1515 \times 10^{-9} \text{ cm}^2 \text{ sec}^{-1} \text{ volt}^{-1}$ (abs.)	(U. S.) 2.332 7507
cm ² second ⁻¹ volt ⁻¹ (absolute)	=	6 4516 $\text{cm}^2 \text{ sec}^{-1} \text{ volt}^{-1}$ (abs.)	(U. S.) 0.809 6892

63. Thermoelectric Power [$\text{mV}^\circ\text{C}^{-1}$]; [$\mu\text{V}^\circ\text{C}^{-1}$]

millivolt per degree Celsius	=	$1.0000 \times 10^{-3} \text{ microvolt per } ^\circ\text{C}$ (abs.)	2.000 0000
millivolt per degree Fahrenheit	=	$1.8000 \times 10^{-3} \text{ microvolt per } ^\circ\text{C}$ (abs.)	2.255 2725
microvolt per degree Celsius	=	$2.9986 \times 10^4 \text{ microvolt per } ^\circ\text{C}$ (abs.)	8 476 9185
microvolt per degree Fahrenheit	=	$5.3975 \times 10^4 \text{ microvolt per } ^\circ\text{C}$ (abs.)	8 732 1910
microvolt per degree Fahrenheit	=	1 8000 $\text{microvolt per } ^\circ\text{C}$	0.255 2725

64. Peltier Coefficient [$\text{mV}^\circ\text{C}^{-1}$]; [$\mu\text{V}^\circ\text{C}^{-1}$]

joule per ampere-hour (absolute)	=	$2.7778 \times 10^{-8} \text{ joule em}^{-1}$	3.443 6975
joule per ampere-hour (absolute)	=	$9.2636 \times 10^{-14} \text{ joule es}^{-1}$	14.966 7790
joule per coulomb	=	10 000 joule em^{-1}	1.000 0000
joule per faraday	=	$1.0363 \times 10^{-4} \text{ joule em}^{-1}$	4.015 4727
joule per electron	=	$6.2811 \times 10^{18} \text{ joule em}^{-1}$	19.798 0361
calorie (15°C) per ampere-hour	=	$1.1625 \times 10^{-3} \text{ joule em}^{-1}$	2.065 3930
calorie (15°C) per coulomb	=	41 850 joule em^{-1}	1.621 6055
millivolt	=	$1.0000 \times 10^{-2} \text{ joule em}^{-1}$	2.000 0000

65. Thomson Effect, Coefficient of; Specific Heat of Electricity [$\text{mV}^\circ\text{C}^{-1}$]; [$\mu\text{V}^\circ\text{C}^{-1}$]

joule coulomb ⁻¹ per $^\circ\text{F}$	=	1 8000 $\text{joule coulomb}^{-1} \text{ per } ^\circ\text{C}$	0.255 2725
joule es ⁻¹ per $^\circ\text{F}$	=	$5.3975 \times 10^9 \text{ joule coulomb}^{-1} \text{ per } ^\circ\text{C}$	9.732 1910
joule em ⁻¹ per $^\circ\text{F}$	=	0 1800 $\text{joule coulomb}^{-1} \text{ per } ^\circ\text{C}$	1.255 2725
joule es ⁻¹ per $^\circ\text{C}$	=	$2.9986 \times 10^9 \text{ joule coulomb}^{-1} \text{ per } ^\circ\text{C}$	9.476 9185
joule faraday ⁻¹ per $^\circ\text{C}$	=	$1.0363 \times 10^{-4} \text{ joule coulomb}^{-1} \text{ per } ^\circ\text{C}$	5.015 4727
joule electron ⁻¹ per $^\circ\text{C}$	=	$6.2811 \times 10^{18} \text{ joule coulomb}^{-1} \text{ per } ^\circ\text{C}$	19.798 0361
volt per $^\circ\text{C}$	=	1 0000 $\text{joule coulomb}^{-1} \text{ per } ^\circ\text{C}$	0.000 0000

66. Piezoelectric Constant [$\text{esu} \text{cm}^{-1} \text{dyn}^{-1}$]; [$\mu\text{esu} \text{cm}^{-1} \text{dyn}^{-1}$]

esu per kilogram weight (g)	=	$3.0577 \times 10^4 \text{ es per dyne}$	4.485 3978
esu per pound weight (g)	=	$6.7411 \times 10^4 \text{ es per dyne}$	4.828 7321
esu per kilogram weight (g)	=	$1.0197 \times 10^{-6} \text{ es per dyne}$	6.008 4793
esu per pound weight (g)	=	$2.2481 \times 10^{-6} \text{ es per dyne}$	6.351 8136
coulomb per kilogram weight (g)	=	$3.0577 \times 10^3 \text{ es per dyne}$	3.485 3978
faraday per kilogram weight (g)	=	$2.9507 \times 10^8 \text{ es per dyne}$	8.460 9251
electron per kilogram weight (g)	=	$4.868 \times 10^{-16} \text{ es per dyne}$	16.687 3617

67. Magnetic Field Intensity; Magnetic Potential Gradient; Magnetizing Force [$\text{mV}^\circ\text{C}^{-1}$]; [$\mu\text{V}^\circ\text{C}^{-1}$]

gauss, absolute	=	1.00010 Int. gauss (v)	0.000 0434
gauss, absolute	=	1 00007 Int. gauss (a)	0.000 0304
International gauss (v)	=	0 99990 abs. gauss	1.999 9566
International gauss (a)	=	0 99993 abs. gauss	1.999 9696
cgsm unit	=	1.0000 abs. gauss	0.000 0000
cgse unit	=	$3.3349 \times 10^{-11} \text{ abs. gauss}$	11.523 0815
gilbert per centimeter	=	1 0000 gauss	0.000 0000
ampere-turn per centimeter	=	1 2566 gauss	0.099 2099
ampere-turn per inch	=	0 49474 gauss	(U. S.) 1.694 3753
gamma, γ	=	$1.0000 \times 10^{-5} \text{ gauss}$	5 000 0000

68. (Magnetic Field Intensity)⁻¹; Coefficient of Leduc Effect [$\text{esu} \text{cm}^{-1} \text{dyn}^{-1}$]; [$\mu\text{esu} \text{cm}^{-1} \text{dyn}^{-1}$]

gauss ⁻¹ (absolute)	=	0 99990 $\text{Int. gauss}^{-1} \text{ (v)}$	1.999 9566
International gauss ⁻¹ (v)	=	1.00010 $\text{gauss}^{-1} \text{ (abs.)}$	0.000 0434
cgsm unit ⁻¹	=	1 0000 $\text{gauss}^{-1} \text{ (abs.)}$	0.000 0000
cgse unit ⁻¹	=	$2.9986 \times 10^{10} \text{ gauss}^{-1} \text{ (abs.)}$	10.476 9185
centimeter per gilbert	=	1 0000 gauss^{-1}	0.000 0000
centimeter per ampere-turn	=	$7.9577 \times 10^{-1} \text{ gauss}^{-1}$	1.900 7901
inch per ampere-turn	=	2 0213 gauss^{-1}	0.305 6246

CONVERSION FACTORS.—Continued

69. Magnetomotive Force; Magnetic Potential [$\text{cm}^1\text{I}^1\text{t}^{-2}$]; [$\mu^{-1}\text{m}^1\text{I}^1\text{t}^{-1}$]

1 gilbert, absolute	=	1 00010	Int. gilbert (v)	0.000 0434
1 gilbert, absolute	=	1.00007	Int. gilbert (a)	0.000 0304
1 International gilbert (v)	=	0.99990	abs. gilbert	1.999 9566
1 International gilbert (a)	=	0.99993	abs. gilbert	1.999 9696
1 egsm unit	=	1 00000	abs. gilbert	0.000 0000
1 cgse unit	=	3 3349 $\times 10^{-11}$	abs. gilbert	11.523 0815
1 ampere-turn	=	1 2566	gilbert	0.099 2099

70. Magnetic Induction; Intensity of Magnetization [$\text{cm}^1\text{m}^1\text{I}^{-1}$]; [$\mu^1\text{m}^1\text{I}^{-1}\text{t}^{-1}$]

Units of Magnetization are not named

1 maxwell per centimeter ² , absolute	=	0.99958	Int. maxwell per cm ² (v)	1.999 8176
1 maxwell per centimeter ² , absolute	=	0 99955	Int. maxwell per cm ² (a)	1.999 8046
1 International maxwell per centimeter ² (v)	=	1 00042	abs. maxwell per cm ²	0.000 1824
1 International maxwell per centimeter ² (a)	=	1 00045	abs. maxwell per cm ²	0.000 1954
1 maxwell per inch ²	=	0 15500	maxwell per cm ²	(U. S.) 1.190 3308
1 egsm unit	=	1 00000	abs. maxwell per cm ²	0.000 0000
1 cgse unit	=	2 9986 $\times 10^{10}$	abs. maxwell per cm ²	10 476 9185
1 line per centimeter ²	=	1 00000	maxwell per cm ²	0.000 0000
1 line per inch ²	=	0.15500	maxwell per cm ²	(U. S.) 1.190 3308

71. Flux of Magnetic Induction; Magnetic Flux; Pole Strength; Quantity of Magnetism [$\text{cm}^3\text{m}^1\text{I}^1$]; [$\mu^1\text{m}^3\text{I}^1\text{t}^{-1}$]

Units of Pole Strength and Quantity of Magnetism are not named

1 maxwell, absolute	=	0 99958	Int. maxwell (v)	1 999 8176
1 maxwell, absolute	=	0 99955	Int. maxwell (a)	1 999 8046
1 International maxwell (v)	=	1.00042	abs. maxwell	0.000 1824
1 International maxwell (a)	=	1 00045	abs. maxwell	0 000 1954
1 egsm unit	=	1 00000	abs. maxwell	0.000 0000
1 cgse unit	=	2 9986 $\times 10^{10}$	abs. maxwell	10 476 9185
1 line	=	1 0000	abs. maxwell	0 000 0000
1 volt-second	=	1 0000 $\times 10^9$	maxwell	8 000 0000

72. Magnetic Reluctance [I^1t^{-2}]; [$\mu^{-1}\text{I}^{-1}\text{t}^{-1}$]

1 oersted, absolute	=	1 00052	Int. oersted	0.000 2259
1 International oersted	=	0 99948	abs. oersted	1.999 7741
1 egsm unit	=	1 0000	abs. oersted	0.000 0000
1 cgse unit	=	1 1122 $\times 10^{-21}$	abs. oersted	21 046 1630

73. Hall Effect, Coefficient of [$\text{cm}^{-1}\text{m}^{-1}\text{I}^{-1}\text{t}^2$]; [$\mu^1\text{m}^{-1}\text{I}^1\text{t}^2$]

1 volt centimeter per ampere gauss (absolute)	=	1.0000 $\times 10^9$	cgsm unit	9.000 0000
1 volt inch per ampere gauss (absolute)	=	2.5400 $\times 10^9$	cgsm unit	(U. S.) 9.404 8346
1 cgse unit	=	2.6962 $\times 10^{21}$	cgsm unit	31.430 7555

74. Ettinghausen Effect, Coefficient of [$\text{cm}^{-1}\text{m}^{-1}\text{I}^{-1}\text{t}^2$]; [$\mu\text{m}^{-1}\text{I}^1\text{t}^2$]

1°C centimeter per ampere gauss (absolute)	=	10 000	°C cm per cgsm unit	1 000 0000
1°F inch per ampere gauss (absolute)	=	45.720	°C cm per cgsm unit	1.660 1071
1°C centimeter per cgse unit	=	8 9916 $\times 10^{20}$	°C cm per cgsm unit	20 953 8370

75. Nernst Effect, Coefficient of [$\text{cm}^{-1}\text{I}^1\text{T}^{-1}$]; [$\mu\text{I}^1\text{T}^{-1}$]

1 volt per gauss °C (absolute)	=	1.0000 $\times 10^9$	cgsm unit per °C	8.000 0000
1 volt per gauss °F (absolute)	=	1.8000 $\times 10^9$	cgsm unit per °C	8.255 2725
1 cgse unit per °C	=	8.9916 $\times 10^{20}$	cgsm unit per °C	20.953 8370

76. Verdet's Constant [$\text{cm}^{-1}\text{m}^{-1}\text{I}^{-1}\text{t}^2\theta$]; [$\mu^1\text{m}^{-1}\text{I}^1\text{t}^2\theta$]

1 minute per gilbert	=	1.0000	minute per cgsm unit	0.000 0000
1 minute per ampere-turn	=	1.2566	minute per cgsm unit	0.099 2099
1 radian per gilbert	=	3 4377 $\times 10^3$	minute per cgsm unit	3.536 2739

77. Fundamental Electric and Magnetic Units

Name of quantity	1 °Cgsm unit equals		Dimensions		
	Cgse units	Practical units (abs.)	Cgse system	Cgsm system	†Practical system
Electric:					
Capacity	c ²	10 ⁹ farad	$\text{cm}^1\text{I}^1\text{t}^{-1}$	$\mu^{-1}\text{I}^{-1}\text{t}^2$	IE^{-1}t
Charge, quantity	c	10 coulomb	$\text{cm}^1\text{m}^1\text{I}^1\text{t}^{-1}$	$\mu^{-1}\text{m}^1\text{I}^1\text{t}^1$	It

CONVERSION FACTORS.—Continued
77. Fundamental Electric and Magnetic Units.—(Continued)

Conductivity (mass)	c ³	10 ⁹ ohm ⁻¹ (cm, g)	cm ⁻¹ Ω ⁻¹	μ ⁻¹ m ⁻¹ Ω ⁻¹	R ⁻¹ m ⁻¹ Ω ⁻¹
Conductivity (surface)	c ²	10 ⁹ ohm ⁻¹	Ω ⁻¹	μ ⁻¹ Ω ⁻¹	R ⁻¹
Conductivity (volume)	c ³	10 ⁹ ohm ⁻¹ cm ⁻¹	Ω ⁻¹	μ ⁻¹ Ω ⁻¹	R ⁻¹ Ω ⁻¹
Current	c	10 ampere	c ¹ m ¹ Ω ⁻¹	μ ⁻¹ m ¹ Ω ⁻¹	I
Dielectric constant	c ³	†10 ⁹ ohm ⁻¹ per (cm sec ⁻¹)	e	μ ⁻¹ Ω ⁻¹	†IE ⁻¹ Ω ⁻¹
Displacement (local)	c	10 coulomb per cm ²	c ¹ m ¹ Ω ⁻¹	μ ⁻¹ m ¹ Ω ⁻¹	It ⁻¹
Displacement (integral)	c	10 coulomb	c ¹ m ¹ Ω ⁻¹	μ ⁻¹ m ¹ Ω ⁻¹	It
Electromotive force	c ⁻¹	10 ⁻⁹ volt	c ⁻¹ m ¹ Ω ⁻¹	μ ¹ m ¹ Ω ⁻¹	E
Field strength	c ⁻¹	10 ⁻⁹ volt cm ⁻¹	c ⁻¹ m ¹ Ω ⁻¹	μ ¹ m ¹ Ω ⁻¹	Et ⁻¹
Inductance	c ⁻²	10 ⁻⁹ henry	c ⁻¹ Ω ⁻¹	μ ¹	Rt
Inductivity	c ²	†10 ⁹ ohm ⁻¹ per (cm sec ⁻¹)	e	μ ⁻¹ Ω ⁻¹	†IE ⁻¹ Ω ⁻¹
Ionic mobility	c	10 ⁹ cm sec ⁻¹ per (volt cm ⁻¹)	c ¹ m ¹ Ω ⁻¹	μ ⁻¹ m ⁻¹ Ω ⁻¹	E ⁻¹ Ω ⁻¹
Polarization capacity	c ²	10 ⁹ farad cm ⁻²	Ω ⁻¹	μ ⁻¹ Ω ⁻¹	IE ⁻¹ Ω ⁻¹
Potential	c ⁻¹	10 ⁻⁹ volt	c ⁻¹ m ¹ Ω ⁻¹	μ ¹ m ¹ Ω ⁻¹	E
Resistance	c ⁻²	10 ⁻⁹ ohm	c ⁻¹ Ω ⁻¹	μ ¹	R
Resistivity (mass)	c ⁻²	10 ⁻⁹ ohm (cm, g)	c ⁻¹ m ¹ Ω ⁻¹	μ ¹ m ¹ Ω ⁻¹	Rm ¹
Resistivity (surface)	c ⁻²	10 ⁻⁹ ohm	c ⁻¹ Ω ⁻¹	μ ¹	R
Resistivity (volume)	c ⁻²	10 ⁻⁹ ohm-cm	c ⁻¹ Ω ⁻¹	μ ¹ Ω ⁻¹	Rt
Specific heat of electricity (Thomson)	c ⁻¹	10 ⁻⁹ volt deg ⁻¹	c ⁻¹ m ¹ Ω ⁻¹ T ⁻¹	μ ¹ m ¹ Ω ⁻¹ T ⁻¹	ET ⁻¹
Specific inductive capacity	l	1	zero	zero	zero
Magnetic:					
Field intensity	c	1 gauss	c ¹ m ¹ Ω ⁻¹	μ ⁻¹ m ¹ Ω ⁻¹	It ⁻¹
Flux of induction (integral)	c ¹	1 maxwell	c ¹ m ¹ Ω ⁻¹	μ ¹ m ¹ Ω ⁻¹	Et
Induction (local)	c ⁻¹	1 maxwell cm ⁻²	c ⁻¹ m ¹ Ω ⁻¹	μ ¹ m ¹ Ω ⁻¹	Et ⁻¹
Intensity of magnetization (volume)	c ⁻¹	1	c ⁻¹ m ¹ Ω ⁻¹	μ ¹ m ¹ Ω ⁻¹	Et ⁻¹
Magnetic flux (integral)	c ¹	1 maxwell	c ¹ m ¹ Ω ⁻¹	μ ¹ m ¹ Ω ⁻¹	Et
Magnetizing force	c	1 gauss	c ¹ m ¹ Ω ⁻¹	μ ⁻¹ m ¹ Ω ⁻¹	It ⁻¹
Magnetomotive force	c	1 gilbert	c ¹ m ¹ Ω ⁻¹	μ ⁻¹ m ¹ Ω ⁻¹	I
Permeability	c ⁻²	1 maxwell cm ⁻² per gauss	c ⁻¹ Ω ⁻¹	μ ⁻¹	I ⁻¹ Et ⁻¹
Pole strength	c ⁻¹	1	c ⁻¹ m ¹ Ω ⁻¹	μ ¹ m ¹ Ω ⁻¹	Et
Potential	c	1 gilbert	c ¹ m ¹ Ω ⁻¹	μ ⁻¹ m ¹ Ω ⁻¹	I
Quantity	c ⁻¹	1	c ⁻¹ m ¹ Ω ⁻¹	μ ¹ m ¹ Ω ⁻¹	Et
Reluctance	c ²	1 oersted	Ω ⁻¹	μ ⁻¹	IE ⁻¹ Ω ⁻¹
Susceptibility	c ⁻²	1/4π maxwell cm ⁻² per gauss	c ⁻¹ Ω ⁻¹	μ ⁻¹	I ⁻¹ Et ⁻¹

* For the purposes of International Critical Tables, c has been taken as 2.9986×10^{10} cm per sec, $\log_{10} c = 10.476\ 0185$, $\log_{10} c^2 = 20.952\ 0370$. This is the accepted value for the velocity of light in vacuo. The best directly determined value of the ratio of the two electrical units of quantity gives $c = 1.9979 \times 10^{10}$ cm per sec. (Rosa and Dorsey, *Bull. U. S. Bur. Standards*, 3: 433; 07.)

† In practice this unit is not used; the quantity given in essentially every instance is the dimensionless "specific inductive capacity," which is numerically equal to the dielectric constant expressed in cgs units.

‡ In this column are given the dimensions in terms of the practical electrical units, as these generally enter into the actual determinations of the several quantities. As three basic electrical units are employed, alternative expressions are possible. T = thermometric degree, R = potential, I = current, E = resistance.

78. Indicated Conversion Factors

a = area, C = electrical capacity, T = thermometric degree, l = density, E = electrical potential, e = electric charge, F = electrical field intensity, h = heat, m = mass, Q = quantity of magnetism, R = electrical resistance, t = time, v = volume, ε = dielectric constant, η = viscosity, θ = plane angle.

Name of quantity	Dimensions	Tables
Electricity		
Electric displacement	eF	14, 53
Polarization capacity	C a ⁻¹	56, 17
Pyroelectric constant	ea ⁻¹ T ⁻¹	19, 17, 12
Specific inductive capacity	zero	
Surface density of charge	ea ⁻¹	49, 17
Thermoelectric power	ET ⁻¹	52, 12
Volume density of charge	ev ⁻¹	49, 19
Heat, capacity	hm ⁻¹ T ⁻¹	35, 21
Latent	hm ⁻¹	35, 4
Reaction	hm ⁻¹	35, 4
Superficial latent	ha ⁻¹	35, 17
Transformation	hm ⁻¹	35, 4

Name of quantity	Dimensions	Tables
Radiation, index of absorption	zero	
Intensity of	ha ⁻¹ l ⁻¹	35, 22
Kerr's constant (magneto-optic)	θQ ⁻¹ a	7, 71, 16
Reflectivity	zero	
Refraction, index of	zero	
Solubility, gases in liquids	zero	
Viscosity, kinematic	ηd ⁻¹	39, 28

79. Hydrometer Scales

Unless the hydrometer is used in the liquid and at the temperature for which it is graduated, corrections must be applied for the changed capillary depression and for the expansion (or contraction) of the instrument. (The following table does not include all scales which have been used.)

T = temperature at which the instrument is to be used; r = reading of instrument; the specific gravity is with reference to water at temperature T unless another temperature is indicated in the last column.

79. Hydrometer Scales.—Continued

Hydrometer	T	Specific gravity		Remarks
		Dense	Light	
A. P. T. = American Petroleum Institute.	60°F = 15.56°C		141.5	Petroleum
			131.5 + r	
		200	200	
Balling	17.5°C	200 - r	200 + r	
Bates.	60°F = 15.56°C	1000 + 2.78r		
		1000		
Baumé	10°R = 12.5°C	145.88 145.88 - r	145.88 135.88 + r	
Baumé	15°C	146.3 146.3 - r	146.3 136.3 + r	
Baumé	17.5°C	146.78 146.78 - r	146.78 136.78 + r	
Baumé	15°C	144.3 144.3 - r		"Rational"
Baumé	15°C	144.3 144.3 - r		"Rational" (water at 4°C)
Baumé-Lunge	12.5°C	144.32 144.32 - r	144.32 144.32 + r	"Rational"
Baumé	15°C	144.32 144.32 - r	144.32 144.32 + r	French (water at 4°C)
Baumé	60°F = 15.56°C	145 115 - r	140 130 + r	American
Beck	12.5°C	170 170 - r	170 170 + r	
		400	400	
Brix	12.5°R = 15.625°C	400 400 - r	400 400 + r	
Cartier	12.5°C	136.8 126.1 - r	136.8 126.1 + r	
Fischer	12.5°R = 15.625°C	400 100 - r	400 400 + r	
Fleischer		1000 + 10r		
		1000		
Gay-Lussac		100 100 - r	100 100 + r	
Gerlach, or "new"	17.5°C	146.78 146.78 - r		
Holland, or "old"	12.5°C	144 144 - r		
Stoppani	12.5°R = 15.625°C	106 106 - r		
Twaddell	60°F = 15.56°C	1000 + 5r		British (water at 4°C)
		1000		

TECHNICAL EFFLUX VISCOMETERS: INTERPRETATION AND INTERCONVERSION OF READINGS

WINSLOW H. HERSCHEL

Since changes are made from time to time in the standardization or method of operation of these instruments, and many old instruments are still in use, it is believed that in general the determination of kinematic viscosity from the readings of the instruments, and direct interconversions between instruments, when used at the same temperature, may be made by the use of Fig. 1, with as great precision (about 5%) as the data will warrant. It is assumed that the instruments are used in the normal manner. For the Saybolt instruments, a higher precision is occasionally justified, and may be obtained by the use of Table 2.

If the instruments are used at different temperatures, appropriate temperature corrections must be applied. For lubricating oils, the viscosity at one temperature may be estimated from that at another by the approximate empirical rule, applicable between 100° and 212°F (37.8° and 100°C), that the logarithmic viscosity-temperature graphs are straight and meet at a point, temperatures being expressed in degrees Fahrenheit. (For other temperatures see (1, 7, 8)). The location of the point of intersection for several classes of oils is given in Table 1.

TABLE 1.—COORDINATES OF POINTS OF INTERSECTION OF LOGARITHMIC GRAPHS⁽⁵⁾

η_0 = viscosity in poises; t_0 = temperature in °F				
Class of oils	$\log_{10} \eta_0$	η_0	$\log_{10} t_0$	t_0
Paraffin base	3.58	0.0038	2.77	589
Naphthene base	3.88	.0076	2.57	371
Mixed base	3.43	.0027	2.78	605
Fatty oils	3.75	.0056	2.82	661

In estimating the viscometer reading at a given temperature for a certain type of instrument, from an observed reading at another temperature with another type of instrument, the following steps may be taken.

1. Determine the kinematic viscosity corresponding to the observed reading by means of Fig. 1.

2. Multiply by the density (g/cm³) so as to obtain the absolute viscosity (η) in poises; find the logarithm of the absolute viscosity and the logarithm of the temperature (t) of test (°F).

3. Plot the observed η , t and the η_0 , t_0 of the point of intersection, as given in Table 1, on logarithmic paper. Or plot the corresponding logarithms on equispaced coordinate paper. In either case, these two points locate a straight graph upon which the viscosity at the desired temperature will be found.

4. Divide the absolute viscosity at the desired temperature by the density at that temperature to get the kinematic viscosity. From this, determine, by means of Fig. 1, the corresponding time of flow on the desired viscometer.

It will be noted that the density under (2) and (4) must be the density at the temperature under consideration, and not the density at 60°F (15.6°C), which is generally the standard for such density determinations.

If an instrument is used in an irregular manner, appropriate corrections must be applied (2, 3, 6, 9).

TABLE 2.—SAYBOLT UNIVERSAL AND SAYBOLT FUROL VISCOMETERS
Units: Time (t), sec; kinematic viscosity = (η/d), poise/(g per cm³).

Saybolt Universal		Saybolt Furol	
t	η/d	t	η/d
32	0.0115	25	0.486
40	0.0417	26	0.512
50	0.0740	27	0.537
60	0.103	28	0.562
70	0.130	29	0.586
80	0.156	30	0.610
90	0.181	35	0.730
100	0.206	40	0.846
125	0.266	45	0.960
150	0.324	50	1.072
175	0.381	60	1.292
200	0.437	70	1.507
225	0.492	80	1.724
250	0.548	90	1.939
275	0.603	100	2.155
300	0.658		

For higher viscosities the kinematic viscosity is equal to 0.00220 t for the Saybolt Universal, or to 0.0216 t for the Saybolt Furol.

LITERATURE

(For a key to the periodicals see end of volume)

- (¹) Fortsch and Wilson, 45, 16: 789, 24. (²) Gans, 262, 6: 218; 90. (³) Herschel, 32, No. 100; 17. (⁴) Herschel, 244, 10: 31; 22. (⁵) Herschel, 45, 14: 715; 22. (⁶) Holde, Examination of hydrocarbon oils, 1917. (⁷) Lane and Dean, 45, 16: 905; 24. (⁸) MacCull, 263, 7: No. 6; 21. (⁹) Ubbelohde, Tabellen zum Engler'schen Viskosimeter, 1907.

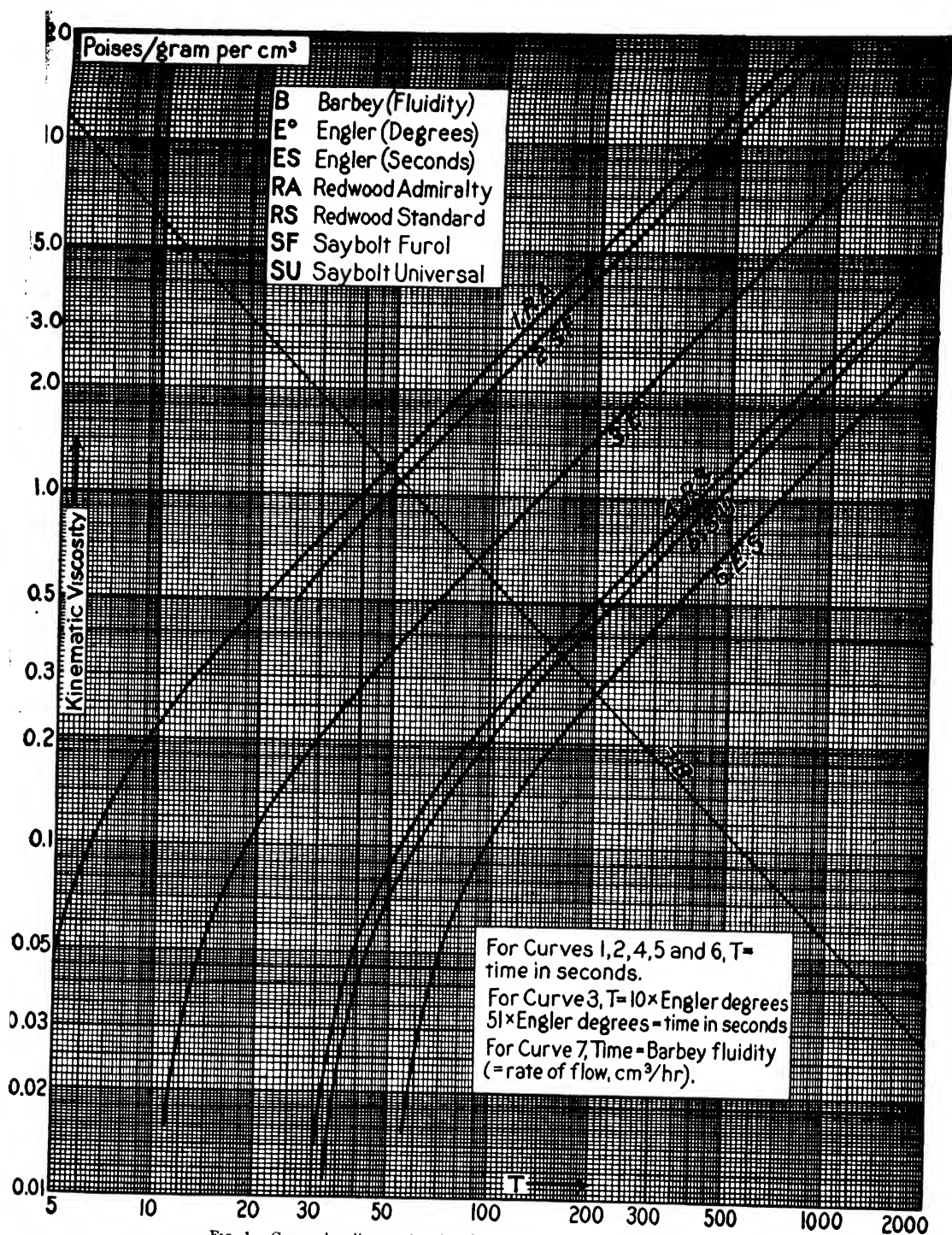


FIG. 1.—Conversion diagram for viscosimeters at a common temperature (4).

SELECTED TECHNICAL TERMS

N. ERNEST DORSEY

In this section are given the definitions of numerous units, and very brief explanations of such technical terms as occur in many sections of the I. C. T. or are for other reasons more suitably considered here than elsewhere. Other terms will be explained where they occur in the body of the work. Symbolical explanations will be given wherever they appear to be satisfactory. In many cases, dimensional formulæ (see p. 18) are given; these are enclosed in []. Symbols are enclosed in (). The sequence will be: Name, symbol or symbols, dimensional formula, definition or explanation; but the symbol or formula, or both may be omitted. For the explanation of the symbols employed in the formulæ and explanations, see p. 16.

Aberration, Constant of. $[\theta]$. $\tan (V-v)/c$. V , v = maximum and minimum velocity of earth in its orbit, c = velocity of light in vacuo.

Absolute. -(abs.). 1. An adjective, descriptive of a system of units which is based upon the smallest possible number of independent units. In this connection, every specification of a definite substance or of a vacuum is to be regarded as the introduction of an independent unit. 2. **Absolute zero.** The temperature at which the pressure of a fixed mass of an ideal gas, maintained at a constant volume, becomes zero. 3. **Absolute temperature.** The temperature reckoned from the absolute zero.

Absorption. When the absorption of radiation by a substance is such that $J = J_0 e^{-kl}$, J , J_0 = intensity, l = length of path, k is the coefficient of absorption. k/d = coefficient of mass absorption. Writing $k = (4\pi k'n)/\lambda$, n = index of refraction, λ = wave length in vacuo, k' = index of absorption. (Some call $k'n$ the index.)

Absorptivity. Ratio of radiant energy absorbed to that absorbed, under same conditions, by a black body.

Action, Planck's constant of. See Planck.

Ampere. Unit of electric current. **Abs. ampere** = 0.1 cgs unit. **Int. ampere** is that unvarying electric current which, when passed through a solution of silver nitrate in water, in accordance with certain specifications, deposits silver at the rate of 0.00111800 gram per second.

Ampere-turn. Unit of mmf. Difference in magnetic potential between the faces of a coil of one turn carrying one ampere.

Ångström unit. -(Å). [l]. 10^{-10} meters. **International Ångström** defined as such a length that wave-length of red cadmium line in air at 15°C, λ_n , is exactly 6438.4696 int. Å; it = 10^{-10} m within experimental error.

Anomalistic. -Anom. year [month] = time between successive passages of earth [moon] through perihelion [perigee].

Aphelion.—Point of planet's orbit farthest from sun.

Apogee.—Point of moon's orbit farthest from earth.

Aries, First point of.—Designation of position of vernal equinox (see Celestial sphere); not at present in constellation Aries.

Assay ton. [m]. 29 $\frac{1}{6}$ grams; as many mg as there are troy ounces in short ton.

Astronomical unit of length. Mean distance (q v.) earth to sun; 149.50×10^6 km.

Astronomical unit of mass.—Mass of sun.

Astronomical unit of time.—Mean solar day.

Atmosphere.—[force/area], $[m/l^2]$. 1. **Normal atmosphere** (A_n) defined as pressure exerted by vertical column of liquid 76 cm long, density 13 5951 grams per cm³, acceleration of gravity being 980 665 cm sec⁻². 2. **Atmosphere at 45°** (A_{45}) differs from A_n only in use of acceleration of gravity at sea level

and lat. 45° instead of 980.655 cm sec⁻². 3. **British atmosphere** is based on 30 inches instead of 76 cm.

Avogadro's number. -(N_0). $[m^{-1}]$. Number of molecules in a mole.

Bar.—[force/area], $[m/l^2]$. Internationally accepted unit of pressure; = 10^6 dyne/cm². Has also been used to denote one dyne/cm² (cf. Barye).

Barye.—[force/area], $[m/l^2]$. The cgs unit of pressure, one dyne/cm². (In accordance with recommendation of special committee of International Congress of Physicists, Paris, 1900, and with the usage of the International Bureau of Weights and Measures.) (cf. Bar).

B. A. unit.—A unit of electrical resistance based on certain coils prepared in 1863-1864 by British Association for Advancement of Science.

Black Body.—One which absorbs all radiant energy incident upon it. Its radiance of wave-length λ is $J_\lambda d\lambda$; the intensity, $J_\lambda = C_1 \lambda^{-5} [e^{C_2/\lambda T} - 1]^{-1}$, T = absolute temperature, C_1 , C_2 are radiation constants. Total radiance (J) is $\int J_\lambda d\lambda$ taken over all wave-lengths. $J = \sigma T^4$, σ = Stefan, or Stefan-Boltzmann constant of total radiation. For each T there is a wave-length (λ_m) for which $J_\lambda (= J_m)$ is a maximum; $J_m = C_3 T^5$, C_3 = intensity coefficient; $\lambda_m = w/T$, w = Wien's displacement constant.

Board of Trade unit.—1. A unit of electrical resistance based upon certain coils preserved by British Board of Trade. 2. (B.T.u.). Unit of work. Generally used in England as equivalent of one kilowatt-hour. (To be distinguished from British thermal unit (BTU).)

Boltzmann's molecular gas constant.—(k). $[ml^2/l^2T]$. Gas constant (q v.) per molecule.

Bougie decimale.— $[\psi\omega^{-1}]$. An old unit of luminous intensity, 0.05 Viole unit.

Brightness.— $[\psi/l^2\omega]$. Luminous intensity per unit of apparent area of the luminous surface; if emission follows Lambert's law, brightness is independent of direction of line of sight, otherwise it is not; in latter case, line of sight is assumed to be normal to the surface unless the contrary is stated.

British Thermal Unit.—(BTU). [energy], $[ml^2/l^2]$. Heat per pound, per °F of rise, required to produce small rise in temperature of water under pressure A_n ; varies with temperature, which must be stated. "Mean" BTU = $\frac{1}{180}$ of heat required to raise one lb. of water from 32°F to 212°F, pressure A_n . (To be distinguished from Board of Trade unit (B.T.u.).)

Bulk modulus.—[stress], $[m/l^2]$. Hydrostatic pressure divided by resulting decrease in volume per unit volume. Also called volume elasticity, cubical elasticity, resistance to compression, modulus of compression (cf. compressibility).

Calorie.—[Heat], $[ml^2/l^2]$. 1. Heat per unit of mass, per °C of rise, required to produce small rise in temperature of water under pressure A_n ; varies with temperature, which must be stated. If unit of mass is gram, it is called small calorie, gram calorie, or calorie; symbol is cal. If unit of mass is kilogram, it is called large calorie, kilogram calorie, or Calorie; symbol, Cal. (2) **Mean calorie** = $\frac{1}{100}$ of heat required to raise unit mass of water from 0°C to 100°C, pressure A_n .

Candle.—(ca). $[\psi\omega^{-1}]$. Basic photometric unit of luminous intensity. A value determined by international agreement, and maintained at certain national laboratories by means of incandescent electric lamps is known as the "International candle."

Candle per square centimeter.— $[\psi/l^2\omega]$. Brightness of surface which, in direction considered, has a luminous intensity of one

candle per cm² of apparent area; π lamberts. Similarly: Candle per sq. in., etc.

Candlepower.—(c.p.). Luminous intensity in terms of candles.

Capacity, heat.—1. Of a substance, is heat per unit of mass, per degree of rise, required to produce a very small rise in temperature, also called **specific heat**, and **thermal capacity**. 2. Of a body, is heat, per degree of rise, required to heat the body.

Capacity, electrical.—Of body *A* with reference to body *B* is $Q/(V_A - V_B)$, all other bodies in the field being insulated and uncharged; *Q* = charge on *A*; *V_A*, *V_B* = potential of *A*, *B*.

Capacity, polarization.—Of one electrode with reference to another is its electrical capacity per unit of area.

Capillary constant.—(a). [l]. 1. **British usage:** $a_1^2 = \gamma/(d_1 - d_2)g$; γ = surface tension, g = acceleration of gravity, ($d_1 - d_2$) = positive difference in the densities of the fluids separated by the surface. 2. **German usage:** $a_1^2 = 2\gamma/(d_1 - d_2)g$. (The subscripts to the *a* are usually omitted.)

Carat fine.—See Karat.

Carcel unit.—A superseded unit of luminous intensity; approximately = 9.6 Int. candles.

Celestial sphere.—Sphere, concentric with earth, serving to locate angular positions of celestial bodies; its intersection with plane of earth's orbit [equator] is called **ecliptic** [celestial equator]; intersections of ecliptic and equator are called **equinoxes**; motion of equinoxes with reference to stars is called **precession of equinoxes**, it is resultant of an oscillatory and a nearly uniform motion, a fictitious equinox possessing only the latter motion is called **mean equinox**. The mean equinox through which sun passes in spring of northern terrestrial hemisphere is called **mean vernal equinox**, and is point from which **celestial longitude** (along the ecliptic) and **mean right ascension** (R. A.) (along the equator) are measured—positive to the east. Intersections of the sphere and the axis of rotation of earth are called **celestial poles**; that of the sphere and its diameter perpendicular to plane of ecliptic called **poles of the ecliptic**. Declinations are measured from equator along great circles passing through the poles—positive towards north; **celestial latitudes**, from ecliptic along great circles passing through poles of ecliptic—positive towards north. The pole of the sphere has a motion compounded of a nearly uniform progressive motion and a rotation about a point having the former motion; that point is called **mean pole**, its motion is the **precession of the pole**, the rotation of the true pole about the mean pole is called the **nutation of the pole**; mean (angular) distance between mean pole and true pole is called **constant of nutation**.

Centi.—Prefix denoting $1/100$.

Centigrade.—(C). Thermometric system in which freezing point of water is called 0° and its boiling point is called 100°; pressure = A_n .

Centigrade thermal unit.—(CTU). [energy], [ml²/t²]. Differs from British Thermal Unit only in the substitution of Centigrade for Fahrenheit scale.

Centimeter.—(cm). 1. The cgs unit of length, 0.01 meter. 2. Often used to denote cgs unit of electrical capacity. 3. Occasionally used to denote cgs unit of electrical inductance.

Centimeter-dyne.—[work], [ml²/t²]. One erg.

Centimeter of water [of mercury, etc.] at t° .—[force/area], [m/t²]. Denotes pressure exerted by a vertical column of water [of mercury, etc.] one cm long, temperature t° , at a place where acceleration of gravity is g , (= 980.665 cm/sec²).

Cheval-vapeur.—[work/time], [ml²/t³]. 1. Primary definition, 75 meter-kilograms per second. Also called **force de cheval**, **continental horsepower**, **Pferdekraft**. 2. For electrical purposes, generally regarded as exactly 736 watts; may be called **continental electrical horsepower**.

Circular inch.—(cir. in.). [l²]. Area of a circle one inch in diameter. Similarly for **circular mil** (cir. mil), **circular millimeter** (cir. mm), etc.

Compressibility.—[l²/m]. Reciprocal of bulk modulus.

Compression, modulus of.—[m/t²]. See Bulk modulus.

Concentration.—1. The amount per unit of volume; may be called **volume concentration**. If amount is measured by mass, the symbol is *C*. 2. The mass of the material per unit of mass of the mixture containing it; may be called **mass concentration**. If both masses are expressed in terms of the same unit, this concentration is generally called the **titer** of the mixture.

Conductance.—Reciprocal of resistance.

Conductance, Specific.—See Conductivity, electrical.

Conductivity, Electrical.—Reciprocal of electrical resistivity (*q.v.*).

1. (a) **Volume conductivity** = reciprocal of volume resistivity; specific conductance. 2. **Mass conductivity** = κ/d ; d = density. 3. **Equivalent conductivity** (Λ) is κ/c ; c = equivalents of solute per unit volume of solution. 4. **Molecular conductivity** (μ) is κ/m ; m = moles of solute per unit volume of solution.

Conductivity, Thermal.—[(heat/area-time)/(T/l)]; [ml/Tt²].

$dQ/dt = -k \kappa dx dy \frac{d\theta}{dz}$; k = thermal conductivity, dQ = amount of heat through $dx dy$, in direction dz , in time dt , $d\theta$ = increase in temperature in distance dz .

Coulomb.—The quantity of electricity transferred in one second by a current of one ampere.

Critical. 1. Any point, line, or region serving to locate a well marked **transition** may be described as critical. 2. As regards **condensation** of vapors, the temperature corresponding to the isotherm above which liquefaction is impossible is called the **critical temperature**; the vapor pressure at which the two phases are in equilibrium at the critical temperature is the **critical pressure**; volume of unit mass at the critical pressure and temperature is the **critical volume**. These three values are called the **critical constants**.

Cubic. (cu.), (³). Used in conjunction with name of unit of length to form name of a related unit of volume; e.g., cubic meter (cu. m) (m³) is name of a unit of volume equivalent to volume of a cube with edges one meter long.

Cubic centimeter atmosphere.—See Liter-atmosphere.

Curie. Internationally defined as amount of radon (radium emanation) which can exist in equilibrium with one gram of radium.

Current.—(*I*). The current of x through a surface *S* is $I = dx/dt$, where dx is the amount of x which passes through *S* in time dt . The density of the current through *S* at a given point is $\sigma = dI/dS$, where dI is the current at that point through an element of *S* of area dS . The value of σ varies with the orientation of dS , and for a certain orientation it is a maximum. The normal, in the direction of the flux, to the element so oriented is the **direction of the current**; and this maximum value of σ is called the **density**, or the **intensity**, of the current at that point.

Dalton.—[m]. A unit of mass, $1/16$ mass of atom of oxygen. Approximately 1.650×10^{-24} grams.

Day.—(da). [t]. 1. **Solar day** = interval between successive transits of sun across same meridian. It is not of uniform length.

2. **Mean solar day** = average length of all the solar days in a tropical year. This is the basis of all our time measurements and is what is meant by day unless the contrary is definitely indicated. 3. **Sidereal day** = interval between successive transits of true vernal equinox. 4. The day defined by successive transits of **same fixed star** is not used in astronomical computations, and appears to have no name.

Deci.—Prefix denoting $1/10$.

Declination.—1. Of celestial objects. See Celestial sphere. 2. **Magnetic declination** = angular deviation of horizontal com-

ponent of earth's magnetic field from northerly measured geographic meridian; easterly deviations, positive.

Degree.—1. ($^{\circ}$), (deg). Unit of difference in temperature; size depends upon thermometric scale employed. 2. ($^{\circ}$). Unit of angle, $\frac{1}{360}$ of complete circumference. 3. ($^{\circ}$). Hydrometer degree is an arbitrary unit of difference in specific gravity; its value depends upon type of hydrometer (see p. 31).

Deka.—Prefix denoting 10.

Demal.—A concentration of one g-equivalent per dm^3 .

Density.—1. Volume density = dQ/dv , dQ = amount of the physical quantity considered which is contained in the element of volume dv . 2. Density of a substance, (d), (D), is dm/dv , m = mass. When, on a particular scale of operation, the density varies from point to point, it may be that on a larger scale it will not; then the density on the larger scale may properly be called the **apparent density** (sometimes called **bulk density**) when operations on the smaller scale are being considered. 3. Surface density = dQ/ds , ds = element of area of surface over which dQ is distributed.

Dielectric constant.—(ϵ). [$l^2/\mu l^2$], [ϵ]. The force (f) of repulsion between two point charges (e , e') of electricity at a distance (r) apart in a uniform medium of great extent is $f = ee'/\epsilon r^2$; ϵ depends upon the nature of the medium, and is called its dielectric constant.

Diffusion, Coefficient of.—See Diffusivity.

Diffusivity.—1. (Δ). $\left[\frac{\text{quantity}}{\text{area time}} \frac{\text{vol. concn.}}{\text{distance}} \right]$, [l^2/t]. $dQ/dt = -\Delta(dc/dx)dydz$. dQ = amount of Q passing through area $dydz$ in direction of x in time dt , dc/dx = rate of increase, in direction of x , of volume concentration of Q . Also called **coefficient of diffusion**. 2. Heat diffusivity. $\left[\frac{\text{heat}}{\text{area} \times \text{time}} + \frac{\text{specific heat} \times \text{density} \times \text{temp.}}{\text{distance}} \right]$, $\left[\frac{\text{heat conductivity}}{\text{density} \times \text{specific heat}} \right]$, [l^2/t]. $dQ/dt = -\Delta cd(dT/dx)dydz$, Δ = heat diffusivity, c = specific heat, d = density, T = temperature. Δcd = thermal conductivity. Δ also called **temperature conductivity**.

Displacement constant, Wien's.—See Black body.

Displacement, Electric.—See Induction, electrostatic.

Draconic month.—See Nodal month.

Dyne.— $[ml/t^2]$. The cgs unit of force. The force which, when acting continuously upon a mass of one gram and not opposed by another, will impart to the mass a uniform acceleration of one cm per sec.²

Dyne-centimeter.—[force length], $[ml^2/t^2]$. The torque of one dyne acting on a lever-arm of one cm.

Ecliptic.—See Celestial sphere.

Elastic modulus.—Ratio of stress to resulting elastic strain. There are as many types of moduli as there are types of strain. 2. Occasionally used to denote **Young's modulus**.

Elasticity.—1. Cubical; see Bulk modulus. 2. Longitudinal; see Young's modulus. 3. Shear; see Rigidity. 4. Torsional; see Rigidity. 5. Modulus of; see Elastic modulus.

Electric displacement, field strength, etc.—See corresponding nouns.

Electromagnetic unit of quantity of electricity.—See Quantity of electricity.

Electromotive force.—(E), (emf). See Potential.

Electron.—Negative electrons are very small negatively charged particles observed under many, very diverse conditions. All appear to be alike in every way, including amount of charge carried. They appear to be one of the basic elements of which atoms are made.

Electronic charge.—(e). A quantity of electricity, of either sign, which is numerically equal to the electric charge carried by an electron.

Electronic mass.—(m_e). The mass of a negative electron when moving with a velocity much less than that of light.

Electronic ratio.—(e/m_e). Ratio of electronic charge to electronic mass.

Electrostatic unit of quantity of electricity.—See Quantity of electricity.

Elongation.—Distance of an oscillating, or of a revolving, body from a point of reference; e.g., the distance of an electron from the nucleus about which it revolves.

Emissivity.—Ratio of radiance of the body to that of a black body at same temperature. If radiation of only one wave-length is considered, it is **monochromatic emissivity**; if all wave-lengths, it is **total emissivity**. The ratio of the radiances (or of the emissivities) of two non-black bodies is called **relative emissivity** of first with respect to second.

English sperm candle.—See Sperm candle.

Equation of time.—See Time.

Equator.—1. The intersection of surface of the earth, or other rotating spheroid, with the plane through its center perpendicular to its axis of rotation. 2. The intersection of the surface of a spheroid with a plane through its center and perpendicular to any diameter chosen as axis. 3. Celestial equator. See Celestial sphere.

Equinox.—See Celestial sphere.

Equivalent.—(equiv). Electrochemical equivalent (briefly equivalent) of an ion—actual or potential—is its formula weight divided by its valence.

Erg.—[force distance], $[ml^2/t^2]$. Work done by a force of one dyne while acting through a distance of one centimeter in its own direction.

Erg-second.—[work time], $[ml^2/t]$. The action produced by one dyne acting through one cm in one sec.

Expansion, coefficient of.—See Expansivity.

Expansivity.— $[T^{-1}]$. 1. Volume expansivity = $dv/(vdT)$. 2. Linear expansivity = $dl/(ldT)$. v , l , T = volume, length, temperature; d or dl is change in v or l produced by change dT in temperature.

Fahrenheit.—($^{\circ}F$). A thermometric system in which 32° denotes the freezing, and 212° , the boiling point of water under pressure of A_m .

Farad.—Capacity of electrical condenser which is charged to a potential difference of one volt by one coulomb.

Faraday.—(F). A subsidiary unit, the electrical charge carried in electrolysis by one gram-equivalent.

Field.—The field of a physical quantity is the region of space within which phenomena characteristic of the quantity exist. The strength, or intensity, of the field at any point is measured by the magnitude at that point of some chosen, characteristic phenomenon, and the complete designation of the field includes an indication of this phenomenon; e.g., electrical field of force. As force is the phenomenon most frequently chosen, and in other cases the context indicates what is intended, the explicit designation of the chosen phenomenon is quite frequently omitted.

Field intensity.—The strength, or intensity, of a field of force at any point is df/dm , where df is the mechanical force experienced by dm , a vanishingly small amount of m placed at that point. For an electrical field, m is positive electricity; for a magnetic field it is a north magnetic pole; for a gravitational field it is mass. Magnetic field strength is frequently called **magnetizing force**.

Fluidity.—(ϕ). Reciprocal of viscosity. Also called **coefficient of fluidity**.

Flux.—1. Flux (ψ) of vector (V) through surface S is $\psi = \int_S V_n dS$; V_n = component of V normal to dS , integral is to be taken over S . 2. Flux of a quantity Q through surface is $\psi = dQ/dt$,

- dQ = amount of Q which passes through S in time dt . 3. From point source. If $V = I/r^2$, where r = distance from source and I is a constant independent of direction, I is called **intensity of the source**, and $\psi = I\omega$; ω = solid angle subtended, at the source, by S (cf. Intensity, luminous).
- Flux, Luminous.**—(ψ). Flux of radiant energy expressed in terms of its power to produce luminous sensation in the human eye.
- Flux, Magnetic.**—Flux of magnetic induction.
- Foot-candle.**—(ψ/l^2). Unit of illumination, one lumen per square foot.
- Foot-lambert.**—($\psi/l^2\omega$). Unit of brightness; see Lambert.
- Foot-pound.**—(ml^2/t^2). Work required to raise one pound a vertical distance of one foot, where $g = 980.665 \text{ cm/sec}^2$ (cf. meter-kilogram).
- Foot-poundal.**—(ml^2/t^2). Work done by force of one poundal ($g.v.$) acting through a distance of one foot.
- Force.**—(ml/t^2). That which imparts acceleration to material bodies.
- Force, Electromotive.**—See Potential.
- Force, Magnetizing.**—See Field intensity.
- Force, Magnetomotive.**—See Potential.
- Force de cheval.**—See Cheval-vapeur.
- Frequency.**—(ν). [N/t]. Number per unit of time. In case of vibrations, waves, etc., the frequency is the number of complete vibrations, of complete waves, etc., per unit of time.
- Gamma.**—(γ). [$\sqrt{m}/\mu l^2$], [\sqrt{m}/t^2]. A unit of magnetic field intensity; 0.000 01 gauss.
- Gas constant.**—1. (R). [work/mass-degree], [l^2/t^2T]. The coefficient R in the ideal gas equation $pv = RTm$; p = pressure, v = volume of the mass m at absolute temperature T . 2. (R). [work/mole-degree]. **Gas constant per mole** obtained by expressing m in moles. 3. (k). [work/molecule-degree], [ml^2/t^2T]. **Boltzmann's molecular gas constant**: obtained by expressing m in terms of number of molecules.
- Gas, Ideal.**—One which strictly satisfies the equation ($pv = RTm$) and other relations deduced from the classical kinetic theory of gases on the assumption that the molecules are infinitely small and devoid of mutual attraction.
- Gauss.**—($\sqrt{m}/\mu l^2$), [\sqrt{m}/t^2]. The cgs unit of magnetic field intensity.
- Gaussian gravitation constant.**—The square root of the intensity of the gravitational field of force of the sun at a point whose distance from the sun is the astronomical unit of length (cf. Gravitation constant).
- Geepound.**—See Slug.
- Gilbert.**—($\sqrt{ml}/\mu l^2$), [$\sqrt{eml^2}/t^2$]. Electromagnetic unit of magnetic potential, of magnetomotive force. Unless contrary is indicated, it is the cgs unit. In precise work, the International gilbert, based upon the Int. elec. units, should be distinguished from the absolute, or cgs, gilbert.
- Grade.**—(θ). Unit of plane angle, $1/400$ of complete circumference.
- Gram atom.**—See Mole.
- Gram calorie.**—See Calorie.
- Gram equivalent.**—See Mole.
- Gram formula weight.**—See Mole.
- Gram weight.**—See Weight.
- Gravitation constant.**—(G). [l^3/mt^2]. The coefficient G occurring in the equation $f = G(mm')/r^2$; f = force of gravitational attraction between two point masses (m, m') in vacuo, r = distance between m and m' (cf. Gaussian gravitation constant).
- Gravity, Acceleration of.**—(g), (g_v). [l/t^2]. Unless the contrary is indicated, this expression refers specifically to the earth, and denotes the resultant acceleration downward experienced by a freely falling body placed at the point considered. It includes centrifugal effects arising from the rotation of the earth, as well as the effects of gravitational attraction (cf. Gravity, standard).
- Gravity, Specific.**—See Specific gravity.
- Gravity, Standard.**—(g_v). [l/t^2]. Standard gravity is the value adopted by the International Committee on Weights and Measures as the "accepted" value of the acceleration of gravity to which all measurements involving this quantity are to be referred. Thus a pressure of x cm of mercury at $t^\circ\text{C}$ is to be understood as denoting the pressure exerted by x cm of mercury at $t^\circ\text{C}$ at a place where the acceleration of gravity is g_v . The accepted value is $g_v = 980.665 \text{ cm/sec}^2 (= 32.174 \text{ ft./sec}^2)$.
- Heat.**—1. By the **heat of a process** is meant the amount of heat evolved, per unit quantity of material involved, during the isothermal process, the process proceeding in the direction indicated. The quantity of material may be expressed in terms of mass, of moles, of equivalents, etc., as may seem desirable. 2. By the **latent heat** of a transformation is meant the amount of heat absorbed per unit quantity of material transformed, the transformation proceeding in the direction indicated. Latent heat of transformation of A to B = -(heat of transformation of A to B) = heat of transformation of B to A .
- Heat diffusivity.**—See Diffusivity.
- Heat, Specific.**—See Capacity, and Specific heat.
- Hecto.**—Prefix denoting 100.
- Hefner unit.**—A superseded unit of luminous intensity; approximately = 0.9 Int. candles.
- Henry.**—(μl), [t^2/d]. Unit of electromagnetic inductance. Defined as that inductance for which an induced electromotive force of one volt is produced when the inducing current is changed at the uniform rate of one ampere per second.
- Horsepower.**—(h.p.). [work/time], [ml^2/t^3]. 1. (HP) **Primary definition** of the term is work done at the rate of 550 foot-pounds per second. 2. For electrical purposes it is regarded as exactly = 746 watts, which is frequently called the **electrical horsepower**. 3. **Continental horsepower.** See Cheval-vapeur.
- Humidity.**—1. **Absolute humidity** of a gas is the actual amount of water vapor per unit volume of the gas. Usually expressed in terms of the actual pressure of the water vapor present. 2. **Relative humidity** of a gas = ratio of the pressure of water vapor present to the pressure of water vapor which is in equilibrium with water at the same temperature. 3. **Dew-point** of a gas is the temperature at which the pressure of water vapor in equilibrium with water is equal to the actual pressure of the water vapor contained in the gas. If the temperature of the gas be varied while its absolute humidity remains unchanged, then the dew-point is that temperature at which the relative humidity is 100%. 4. If the bulb of a thermometer be encased in a fabric which is kept wet with water (**wet-bulb**), the thermometer will record a lower temperature than if the bulb were dry (**dry-bulb**). If the circulation over the wet bulb is sufficiently rapid, the difference in the temperatures depends solely upon the total pressure of the gas, its absolute humidity, and its temperature. Hence the humidity of the atmosphere, or of any other very large volume of gas, can be readily determined by the use of wet- and dry-bulb thermometers.
- Hydrometer.**—An instrument which, by the extent of its submergence, indicates the specific gravity of the liquid in which it floats. Frequently, its readings are expressed in degrees ($^\circ$). Various systems of graduations are in use, see p. 31.
- Hygrometric.**—Pertaining to humidity of atmosphere.
- Hypsometry.**—The art of measuring the elevation above sea-level. More specifically, the use of the boiling-point of water for such measurements.
- Ice point.**—(T_0). Temperature at which water freezes when under the pressure of one normal atmosphere.
- Ideal gas.**—See Gas, ideal.

Illumination.— (ψ/l^2) . The illumination at a point of a surface is the surface density of the luminous flux incident at that point.

Inch of water [of mercury, etc.] at t° .—Analogous to cm of water ($q.v.$)

Index of absorption.—See Absorption.

Index of refraction.—See Refraction.

Inductance.—The electrical inductance of circuit A with reference to circuit B is ψ_A/I_B ; ψ_A = flux of magnetic induction through A as a result of the current I_B in B . A and B may be the same circuit.

Induction.—1. That modification which is acquired by a medium when it becomes the seat of a field of force, and which is evidenced by the fact that its boundaries with other media exhibit distinctive properties which they do not possess in the absence of the field. 2. The distinctive properties mentioned in (1); as in magnetization by induction, induced electric charges, etc. 3. **Electrostatic induction.** $[\sqrt{m}/\mu l^2]$, $[\sqrt{cm}/l^2]$. ϵF , ϵ = dielectric constant, F = intensity of electrostatic field of force. **Electric displacement** = $\epsilon F/4\pi$. 4. **Magnetic induction** (B). $[\sqrt{\mu m}/l^2]$, $[\sqrt{m}/cl]$. $B = \mu H$, μ = magnetic permeability, H = intensity of magnetic field of force. 5. **Electromagnetic induction** is the phenomenon which is characterized by the appearance, in every circuit, of a cyclical emf which is proportional to the rate of change of the flux of magnetic induction through that circuit.

Intensity coefficient.—See Black body.

Intensity, Field.—See Field intensity.

Intensity, luminous. 1. Of a point source in a given direction = amount of luminous flux, per unit of solid angle, which the source emits in the direction considered. 2. Of a point of an extended source = brightness of that point of the source; also called intrinsic brightness. 3. Of an extended source, in a given direction, is its intensity at a point so distant in the stated direction that the source may be regarded as a point. For nearer points the apparent intensity will depend upon the distance, and is defined as the intensity of that point source which at the same distance will produce the same illumination (*cf.* flux).

Intensity of magnetization.—See Magnetization.

Intensity of radiation. 1. The intensity of the radiation emitted in a specified direction by a body is the amount of radiant energy emitted in that direction, per unit of time, per unit of area, and per unit of solid angle of emission. For spectral, or monochromatic, intensity, *See* Radiance. 2. Of received radiation, *See* Irradiation. 3. Of radiation in transit. The amount of radiant power per unit area which passes through an element of area which is normal to the direction of propagation; this equals the volume density of radiant energy at the point considered.

International electrical units.—A system of electrical and magnetic units based upon the ohm, the ampere, and secondarily upon the volt, all as realized by certain concrete standards which have been internationally agreed upon, and upon the cgs units for such other quantities as may be involved. The concrete standards have been so chosen as to make the international system nearly identical with the practical system; as now defined, the outstanding discrepancy in no case exceeds 52 parts in 100 000. In distinguishing between the two systems, the units of the practical system are described as absolute, those of the other, as international. The introduction of the volt as a secondary unit defined by a concrete standard (Weston normal cell = 1.018300 Int. volts at 20°C) introduces confusion when measurements of high precision are to be recorded. In these Tables, values based upon the Int. ohm and the Int. ampere (as defined by the silver voltameter) are

denoted by (a). Those based on the Int. ohm and the Int. volt (as defined by the standard cell) are denoted by (v).

Irradiation.—The radiant power, per unit of area, incident upon a surface.

Joule.— $[ml^2/l^2]$. 1. Absolute joule = 10^7 ergs. 2. International joule = work expended per second by an Int. ampere in an Int. ohm.

Karat.—(K). Denotes the "fineness of gold" in terms of parts (by weight) of gold per 24 parts of the alloy. Twenty-four g of an n karat alloy contains n g of gold, the alloy is " n carats fine."

Kelvin.—(K). Name applied to the absolute centigrade scale of temperature.

Kilo.—Prefix denoting 1000.

Kilogram calorie.—See Calorie.

Kilogram-meter.—A torque equivalent to that of one kilogram weight acting on a lever-arm one meter long.

Kilowatt-hour.—Work expended by one kilowatt in one hour. In Great Britain it is quite generally called Board of Trade unit (B.T.u.).

Kinematic viscosity.— $[l^2/l]$. Ratio of viscosity to density.

Lambert.— $[\psi/l^2\omega]$. The brightness of a surface which, radiating in accordance with Lambert's law, emits a total luminous flux of one lumen per cm^2 . For such a surface, brightness is independent of direction of the line of sight and equals $1/\pi$ lumen, per steradian, per cm^2 = $1/\pi$ candles per cm^2 . If the total emission is one lumen per sq. ft., the brightness is called one foot-lambert.

Lambert's law.— $I = I_0 \cos \theta$; I_0/I = intensity of radiation emitted in direction normal [at angle θ with normal] to the surface. In many cases this law does not express the facts.

Latent heat.—(l , L). *See* Heat.

Latitude.—(Int.). 1. The angular distance of a point from the equator of a spheroid, measured along a great circle passing through the poles. 2. Celestial latitude. *See* Celestial sphere.

Legal ohm.—A unit of resistance; so designated by the International Conference of 1884, and defined as the resistance of a column of mercury 1 mm² in cross-section and 106 cm in length at the temperature of melting ice. It was never legalized.

Light-year.—Distance traveled by light in free space in one year.

Line.—Unit of flux of magnetic induction = one maxwell.

Liter-atmosphere.—The amount of external work done when a volume is increased by one liter against an external pressure of one atmosphere.

Longitude. (long.). 1. The longitude of a point is the angle which its axial plane makes with a fiducial one. For the earth, angles measured from the fiducial plane towards the west are usually considered positive. 2. Celestial or astronomical longitude. *See* Celestial sphere.

Loschmidt's number.—(n_0). $[l^{-3}]$. Number of molecules per unit volume of an ideal gas at 0°C and pressure A_0 .

Lumen.— $[\psi]$. Fundamental unit of luminous flux. A uniform point source of one candle emits 4π lumens.

Luminous flux.—See Flux, luminous.

Luminous intensity.—See Intensity, luminous.

Lunar month.—The time which elapses between successive new moons. Also called synodical month.

Lux.—A unit of illumination, one lumen per square meter.

Magnetic flux.—See Flux, magnetic.

Magnetic induction.—See Induction.

Magnetic moment.—See Moment.

Magnetization, Intensity of.—Magnetic moment per unit of volume (*cf.* moment).

Magnetomotive force.—(mmf). *See* Potential.

Magnitude.—The **magnitude**, or **apparent magnitude**, (m) of a star is primarily an indication of the amount of light the earth receives from it. The value to be assigned to the latter depends upon the characteristics of the perceptive apparatus; visual, photovisual, photographic, and radiometric magnitudes are to be distinguished. Certain stars near the north pole have been chosen as standards; the numerical magnitudes assigned to them are such as represent satisfactorily the range covered by early naked-eye estimates, and satisfy the equation $m = 2.5 (\log_{10} I_0 - \log_{10} I)$, I = intensity of light from a star of magnitude m , and I_0 = that from one of magnitude zero. For Vega, $m = 0.2$; a star of $m = 6$ is near the limit of naked-eye visibility. The **absolute magnitude** M is internationally defined as the apparent magnitude the star would have if its distance were 0.1 parsec; $M = m + 5 + 5 \log_{10} \pi$, π = parallax expressed in".

Mass, Engineers' unit of.—See Slug.

Maxwell.—The cgs unit of flux of magnetic induction.

Mean distance.—In astronomical parlance, the mean distance of a planet from the sun denotes the mean of the greatest and the least distance from the sun to the path of the planet. Similarly in other cases.

Mean spherical candlepower.—Average candlepower of a source, in all directions.

Mega.—Prefix = 1 000 000.

Megmho.—Conductance of one reciprocal microhm.

Meter-candle.—The illumination of an element of surface one meter distant from a uniform source of one candle situated upon the normal to the center of the element. One lux.

Meter-kilogram.— $[ml^2/t^2]$. Work required to raise one kilogram a vertical distance of one meter at a place where the acceleration of gravity is 980 665 cm/sec.²

Mho.—An electrical conductance of one reciprocal ohm.

Micro.—Prefix denoting $1/10^6$.

Microhm.— 10^{-6} ohm.

Micromicro.—Prefix denoting $1/10^{12}$.

Micron.—(μ). Unit of length = $1/10^6$ m = 0.001 mm.

Mil.—0.001 in. (cf. Circular mil).

Milli.—Prefix = 0.001.

Millimicro.—Prefix = 0.000 000 001.

Minute.—1. (min). Time, $1/1440$ of a day. 2. ('). Unit of angle, $1/60$ degree. 3. ("). Centesimal minute = unit of angle = 0.01 grade.

Modulus.—1. See Elastic modulus. 2. For the several elastic moduli—bulk, compression, elasticity, rigidity, torsion, Young's—see distinguishing name.

Mohs.—An arbitrary scale of hardness based upon a selected list of 10 native minerals.

Mole.—A variable, derived unit of mass; its mass is numerically equal to the molecular weight of the substance measured. The expressions **gram-mole**, **kilogram-mole**, etc. are used to designate the basic unit of mass employed. Similarly derived units based upon the atomic weight, the formula weight, or the equivalent are called the **gram-atom**, **gram-formula weight** or **gram-equivalent** when the gram is the basic unit, and correspondingly in other cases.

Molecular.—For molecular properties, see appropriate properties.

Molecular volume.—Volume occupied by one mole. Molecular weight divided by density.

Molecular weight.—(M). The sum of the atomic weights of all the atoms contained in a molecule.

Moment.—1. Of **force** (F) about a point = Fl , l = perpendicular distance from the point to the line of F . 2. Of a **couple** = product of either force times perpendicular distance between them. 3. Of a **magnet** = moment of couple acting upon it when it is at right angles to a magnetic field of unit intensity. 4. Of **inertia** about an axis = sum of the products

of each element of mass times the square of its distance from the axis.

Month.—1. Period of time determined by motion of moon. See lunar, synodical, tropical, sidereal, anomalistic, nodical, draconic. 2. **Solar month** = $1/12$ of tropical year. 3. **Calendar month** = conventional subdivision of year.

Myria.—Prefix = 10 000.

Node.—1. A point of a **standing wave** where the displacement is independent of the time. 2. In **astronomy**, the points where an orbital, or other, plane cuts the ecliptic; the **rising node** is the one at which the passage across the plane of the ecliptic is from south to north.

Nodical month.—Time required by the moon to pass from one rising node to the next. Also called **draconic month**.

Noon.—See Time.

Normal.—1. The normal to a **surface** is a line drawn perpendicular to the surface at the point considered. 2. Any line perpendicular to another may be said to be normal to it. 3. A **concentration** of one gram-equivalent per liter.

Normal atmosphere.—(A_n). See Atmosphere.

Numeric.—(N). A pure number. A dimensionless quantity.

Nutation.—See Celestial sphere.

Oersted.—The cgs unit of magnetic reluctance.

Ohm.—(Ω). A unit of electrical resistance. 1. **Absolute ohm** = 10^9 cgs units. 2. **International ohm** is the resistance, at the temperature of melting ice, offered to an unvarying electric current by a column of mercury, of constant sectional area, having a mass of 14.521 grams and a length, at the temperature mentioned, of 106 300 cm.

Ohm-centimeter.—Unit of electrical volume resistivity. The resistivity of a material of which a uniform bar one cm³ in sectional area has a longitudinal resistance of one ohm per cm of length. Frequently called one ohm per centimeter cube.

Ohm (cm, gram).—Unit of electrical mass resistivity. The resistivity of a material of which a bar, having such a uniform section that its mass per linear cm is one gram, has a longitudinal resistance of one ohm per cm of length.

Ohm (meter, mm).—Unit of electrical volume resistivity. The resistivity of a material of which a circular cylinder one mm in diameter has a longitudinal resistance of one ohm per meter.

Ohm (meter, mm²).—Unit of electrical volume resistivity. The resistivity of a material of which a circular cylinder one square mm in sectional area has a longitudinal resistance of one ohm per meter.

Ohm (mil, ft.).—Analogous to ohm (meter, mm). Cylinder one mil in diameter, resistance of one ohm per foot.

Ohm (mile, pound).—Analogous to ohm (cm, gram).

Ohm-inch.—Analogous to ohm-centimeter.

Parallax.—1. The **annual parallax** of a star is defined as the maximum angle subtended by one astronomical unit of length at the distance of the star from the sun. 2. The **equatorial horizontal parallax** of a member of the solar system is the maximum angle subtended by the equatorial radius of the earth at the distance of the earth from the member considered.

Parsec.—The distance of a star for which the annual parallax is one second of arc.

Pentane candle.—A superseded unit of luminous intensity = one Int. candle.

Percent.—(%). The number of units of the constituent in 100 units of the mixture containing it. If units of volume are used, the ratio is called **volume percent**; if units of mass, it is called **mass percent**, **weight percent**, or simply **percent**. (%) must be distinguished from ‰ which is frequently used to denote per thousand.)

Perigee.—That point of the moon's orbit which is nearest to the earth (cf. apogee).

Perihellion.—That point of a planet's, or comet's, orbit which is nearest to the sun (*cf.* aphelion).

Permeability.—(μ). The force (f) of repulsion between two rigidly magnetized poles (m, m') at a distance r apart is $f = (mm')/(\mu r^2)$; μ depends upon the material in which the poles are immersed, and is called its permeability.

Pferdekraft.—*See* Cheval-vapeur.

Phot.—An illumination of one lumen per cm².

Photoelectric constant.—1. h/e . It is $1/\nu$ of the rise in potential required to impart to a negative electron the energy it has when emitted under the action of radiation of frequency ν . 2. hc/e . This is λ times the rise in potential mentioned in (1). λ = wave-length in vacuo.

Planck's constant of action.—(h). $[ml^2/t]$. A universal constant which fixes the amount of energy contained in the individual bundles, or quanta, of radiation emitted by a radiating body. Each such bundle contains an amount of energy $= h\nu$, ν = vibration frequency of the radiation. h is also called **Planck's quantum**.

Poise.— $[m/lt]$. The cgs unit of viscosity. If the tangential force, per unit area, which one layer of a fluid exerts upon an adjacent one is one dyne when the space rate of variation of the tangential velocity from layer to layer is unity, the viscosity of the fluid is one poise.

Poisson's ratio.—If a bar of uniform section be subjected to a pure tensile stress, the ratio of its transverse contraction per unit of transverse thickness to its elongation per unit of length is called the Poisson's ratio of the material.

Pole strength.—*See* Quantity of magnetism.

Poncelet.—Unit of power = 100 meter-kilograms per second.

Potential.—The excess of the potential at the point A over that at B , with reference to any quantity m , is the mechanical work per unit of m which must be done in carrying a very small positive amount of m from B to A . The difference in electrical potential is called **electromotive force**, emf, **potential difference**; in magnetic potential, is called **magnetomotive force**, mmf.

Potential gradient.—The space rate of increase in the potential. If the direction in which the rate to be measured is not stated, that corresponding to the maximum gradient is to be understood.

Pound weight.—*See* Weight.

Poundal.—The unit of force in the fps system. It is the force which, if acting continuously upon a mass of one pound, will impart to it a uniform acceleration of one foot per second² (*cf.* Dyne).

Power.—1. The time rate of doing work. 2. If when the two junctions of a bimetallic circuit differ in temperature by a small amount (dt), there is an open circuit emf (dE) around the circuit, then $(dE)/(dt)$ is called the **thermoelectric power** of the circuit, corresponding to the average temperature of the two junctions. 3. The ability to do some specific thing; as in rotatory power.

Practical electric units.—A system of electrical units based upon 10^9 cm, 10^{-11} grain, sec, and the permeability of a vacuum, as fundamental units. The units of most interest are the ohm ($=10^9$ cgs), ampere ($=0.1$ cgs), and volt ($=10^8$ cgs). Frequently described as absolute (*cf.* Int. elec. units).

Precession of the equinoxes.—*See* Celestial sphere.

Pressure.—(p), (P). $[m/lt^2]$. Normal force per unit of area. A **hydrostatic pressure** is a pressure which is the same in all directions. For critical pressures, *see* Critical.

Quadrant.—1. Unit of angle = 90° . 2. Formerly used occasionally to denote the **henry**.

Quantity of electricity.—1. (es). The electrostatic unit is that quantity which when concentrated to a point and placed at unit distance from an equal point charge will exert upon it a

unit force, the surrounding medium being a vacuum. 2. (em). The **electromagnetic unit** is that quantity which is transferred per unit of time across any section of an infinitely long, straight, linear conductor when the current is such that the intensity of the resulting magnetic field at unit distance from the conductor is unity. 3. For other units—coulomb, electronic charge, faraday—*see* corresponding names.

Quantity of magnetism.—Also called **pole strength**. 1. The **electromagnetic unit** is that quantity which when concentrated to a point pole and placed at a unit distance from an equal point pole will exert upon it a unit force, the surrounding medium being a vacuum. 2. The **electrostatic unit** is that quantity which when concentrated to a point pole and placed at a unit distance from an infinitely long, straight, linear conductor would experience a unit force as a result of a current in the conductor such that one electrostatic unit of electricity per second is transferred across each section of the conductor. 3. The **Int. electric unit** is not named, it is the same as the cgs unit.

Quantum.—1. Certain processes are essentially discrete, and consequently parcel out into bundles the several quantities involved. If for a certain quantity and a particular process these bundles are all alike, it is now customary to call them quanta, without implying that the quantity so bundled has in itself any atomistic properties. 2. **Planck's quantum**. *See* Planck.

Radian.—An angle which encloses, of the circumference of a concentric circle, an arc = radius.

Radiance.—The radiance of a body, within the spectral range λ_1 to λ_2 , is defined as the intensity of the radiant energy, having wave-lengths lying between λ_1 and λ_2 , which the body emits in a direction perpendicular to its radiating surface. If the spectral range is not mentioned, all wave-lengths are to be included; this is frequently called the **total radiance**. The **spectral, or monochromatic, intensity** of the radiance of wave-length λ is defined as the ratio of the radiance within the range $(\lambda - \frac{1}{2}d\lambda)$ to $(\lambda + \frac{1}{2}d\lambda)$ to $d\lambda$, when the latter is indefinitely small (*cf.* Emissivity).

Radiation constants.—*See* Black body.

Rankine.—A name sometimes applied to the absolute Fahrenheit scale of temperature.

Réaumur.—(R). A thermometric system in which the freezing point of water is called 0° , and the boiling point, 80° .

Reflectivity.—The ratio of the intensity of the light specularly reflected from a surface to the intensity of the light incident upon it. It is a pure numeric.

Refraction.—1. The **index of refraction, refractive index, or refractive exponent** is $n = \sin i/\sin r$; i = angle of incidence from a vacuum upon the substance, and r = angle of refraction, each measured from the normal to the surface. 2. **Refractivity** is $(n - 1)$. 3. **Specific refractivity** (r_d) is $(n - 1)/d$. **Specific refraction** (r_L) is $(n^2 - 1)/d(n^2 + 2)$. d = mass per unit of volume. 4. **Molecular refractivity** = Mr_d . **Molecular refraction** = Mr_L . M = molecular weight. By replacing M by the atomic weight, the corresponding **atomic values** are obtained. 5. **Refractive constant** of a solute is its specific refractivity computed on the assumption that the refractivity of the solution is equal to the sum of the refractivities of its pure constituents each multiplied by the ratio of its mass per unit volume of the solution to its own density when pure.

Reluctance.—The magnetic reluctance of a body between two specified equipotential surfaces is the ratio of the difference in the two potentials divided by the flux of magnetic induction from [to] either surface to [from] the body. It has no significance unless these two fluxes are the same.

Resistance.—1. The **electrical resistance** of a body between two specified equipotential surfaces is E/I , where E is the unchanging difference in the potentials of the surfaces and I is the result-

ing current across any transverse section between them. 2.

Specific resistance.—See Resistivity.

Resistivity.—1. [resistance \times length]. **Resistivity**, or **volume resistivity**, of a substance is the longitudinal resistance per unit of length of a uniform bar of the substance of unit sectional area. 2. [resistance \times mass/(length)²]. **Mass resistivity** of a substance is the longitudinal resistance per unit of length of a uniform bar of the substance of such a sectional area that it contains one unit of mass per unit of length. 3. [resistance]. **Surface resistivity** is the resistance per unit of length of a strip of the surface of unit width. It has reference solely to the current which is restricted to the surface.

Rhe.—Name proposed for cgs unit of fluidity; = one reciprocal poise.

Right ascension.—See Celestial sphere.

Rigidity.—If to the four faces of a cube which are parallel to a given edge there be applied tangential stresses which are equal in absolute value, perpendicular to the given edge, and so directed as to produce a pure distortion, the other two faces will be deformed into diamond shaped figures if the material is isotropic. The modulus of rigidity is defined as the quotient of the stress on any one of the faces divided by the resulting change in any one of the angles of a distorted face. Also called **modulus of shear**, **Coulomb's modulus**, **modulus of torsion** (the last is undesirable).

Rotation.—See Rotatory power.

Rotatory power, Optical. 1. The **natural rotatory power** is θ/l , where θ is the rotation of the plane of polarization which occurs in a path of length l . The **specific rotatory power** ($[\alpha]$) is θ/dl , d = density. The **molecular** [or **atomic**] **rotatory power** is $M\theta/dl$ [or $A\theta/dl$]; M = molecular, A = atomic weight. 2. The **magnetic rotatory power** is $\theta/(H \cos \alpha)$, where H = intensity of the magnetic field and α = angle between H and the path of the light. It is commonly called **Verdet's constant**. From the magnetic rotatory power, the **specific** ($[\omega]$), **molecular**, and **atomic magnetic rotatory powers** are derived exactly as in the case of natural rotation. The ratio of any one of these quantities to the corresponding one for a chosen reference substance is called the **relative power**. Water is the reference substance commonly chosen, and $[\Omega]$ is used to denote the molecular magnetic rotatory power relative to water.

Rydberg's fundamental frequency, and series constant.—See Series, spectral.

Secohm.—A superseded name for the henry.

Second.—1. (sec). Time, $1/86400$ day. Mean solar day, unless contrary is indicated. 2. ("). Unit of angle, $1/3600$ degree. 3. ('). Centesimal second = 0.0001 grade.

Seger cone.—One of a graded series of cones of refractory material which, by their softening and the resultant deformation, indicate the heat treatment to which they have been subjected.

Series, Spectral.—Spectral lines, or groups of lines, which occur in orderly sequence. Most of these sequences can be represented by an equation of the form $\frac{1}{\lambda} = A - \frac{BN}{(m + \alpha + \beta/m^2)^2}$; λ = wave-length in vacuo; m is an integer varying from one line (or group) to another; for any one series, A , B , N , α and β are constants; B is an integer; N is known as **Rydberg's constant**, its value is determined by the constitution of the radiating atom. On Bohr's theory, $N = N_\infty \frac{M}{M + m_e}$, where M = mass of the atom, m_e = electronic mass, and $N_\infty = 2\pi^2 m_e e^4 / h^2 c \epsilon_0^2$; N_∞ is known as **Rydberg's universal series constant**; e = electronic charge; h = Planck's constant; ϵ_0 = dielectric constant of vacuum; c = velocity of light in vacuo. On this theory, B denotes the number of electrons displaced from their normal positions, m is the **principal quantum number**, α depends

upon the subordinate, or azimuthal, quantum number, and $\beta = 0$. For atoms of the type of hydrogen, $\alpha = 0$, $\beta = 0$; for others ($m + \alpha + \beta/m^2$) is frequently called the **effective quantum number**, generally it is not an integer. **Rydberg's fundamental frequency** is $\nu_\infty = cN_\infty$.

Sidereal month.—The time required for the moon to complete one apparent circuit among the stars.

Siemens unit.—(S.E.). A superseded unit of electrical resistance proposed in 1860 by Werner von Siemens; defined as the resistance at 0°C of a column of mercury one meter long and of a uniform cross section = one mm².

Slug.—A unit of mass. 1. The mass which will acquire an acceleration of one foot per sec² when continuously acted upon by a force of one pound weight. Also called **geepound**, and **engineer's unit of mass**. 2. The **metric slug** is the mass which will acquire an acceleration of one meter per sec² when continuously acted upon by a force of one kilogram weight.

Solar month.— 1_{12} tropical year.

Solubility. 1. By solubility of the non-gas a in b is meant the mass of a per unit mass of b which is contained in the mixture which is in equilibrium with an excess of a . In this mixture b is said to be saturated with a . Data are frequently restricted to mass of a per unit mass of mixture, mass of a per unit volume of mixture, or moles of a per mole of mixture. 2. Solubility of a gas is C_s/C_v , C_s = concentration of gas in the solution, C_v = concentration of gas in overlying gas phase. 3. **Solubility product** of an ionized substance ($A_n B_m$) in a stated solvent = $[A]^n \cdot [B]^m$, where $[A]$ and $[B]$ denote the concentrations of the two ions when the solution is saturated with the substance.

Specific gravity.—($d_1^{t_2}$). The ratio of the mass of a certain volume of the substance at the temperature t_2 to that of the same volume of a reference substance (usually water) at temperature t_1 . Frequently, but incorrectly, called density.

Specific heat.—1. **Heat capacity.** See Capacity. 2. **Specific heat of electricity.**—See Thomson effect. 3. **Einstein's specific heat constant** (β) = ratio of Planck's constant (h) to Boltzmann's molecular gas constant (k_0). 4. **Ratio of specific heats** = $\gamma = c_p/c_v$; c_p , c_v = specific heat at constant pressure and at constant volume, respectively.

Specific inductive capacity.—The ratio of the dielectric constant of the substance to that of a vacuum.

Specific refractive power.—Used indifferently to denote several of the refractive constants (cf. Refraction).

Sperm candle, English.—A superseded unit of luminous intensity = one Int. candle.

Spheradian.—See Steradian.

Spherical candlepower, Mean.—See Mean spherical candlepower.

Square.—(sq.), (\square). Used in conjunction with the name of a unit of length to form the name of a related unit of area; e.g., square foot (sq. ft.), (ft.²) is the name of a unit of area equivalent to the area of a square with edges one foot long.

Square degree.—The solid angle enclosed by a cone of vanishingly small vertex angle 2θ is $k\pi\theta^2$. If θ is expressed in radians and the unit of solid angle is so chosen that $k = 1$, that unit is called a **steradian**. If θ is expressed in degrees, and $k = 1$, the corresponding unit of solid angle is called a **square degree**. One square degree = $(\pi/180)^2$ steradians. This procedure defines a definite unit of solid angle although the solid angles enclosed in cones of finite vertex angles are not proportional to the squares of those angles.

Stefan's constant.—See Black body.

Steradian.—The solid angle which encloses on the surface of a concentric sphere an area = (radius)².

Stoichiometric.—Pertaining to the ratio of the masses of the several elements contained in a pure chemical compound.

Strain.—1. For pure distortion the strain is measured by the change in a significant angle. 2. The ratio of change in size to original size.

Stress.—The force per unit of area over which it acts.

Surface tension.—(γ). [m/P]. Owing to molecular attraction, two fluids in contact adjust themselves so that the area of their interface is a minimum, consistent with other requirements. This adjustment may be pictured as arising from a tension residing in the surface itself; to this is given the name **surface tension**. Its value is defined as the normal, tensile force, per unit of length, across any line traced on the surface.

Susceptibility.—(κ). In the electromagnetic systems of units, $4\pi\kappa$ is the excess of the magnetic permeability of the substance over that of a vacuum.

Synodical.—In astronomy, the synodical period of a body is the interval between its successive returns to the same position with reference to the plane which is perpendicular to the plane of the ecliptic and which continuously passes through the centers of the earth and the sun.

Synonical month.—See Lunar month.

Temperature conductivity.—See Diffusivity.

Tension, Surface.—See Surface tension.

Tenth-meter.— 10^{-10} meter; one Ångström unit.

Thermal.—See Heat.

Thermoelectric power.—See Power.

Thomson effect.—In a region in which the temperature of a homogeneous metallic conductor varies from section to section, there exists a potential gradient which is proportional to the product of the temperature and its gradient. This is the Thomson (or Kelvin) thermoelectric effect. The constant of proportionality is called the coefficient of the effect. If the coefficient is positive, a positive electric current flowing from hot section to cooler section tends to make the temperature more uniform; it is as if the current carried heat from hot portion to cooler portion, as if the electricity had a certain specific heat. This is what Thomson called the **specific heat of electricity**. It may be either positive or negative, depending upon the metal.

Time.—**True noon**, or **local true noon**, is the instant at which the sun is bisected by the meridional plane of the observer. **Mean noon**, or **local mean noon**, is the instant at which a fictitious mean sun is bisected by the meridional plane. This **mean sun** is one endowed with such a uniform, apparent angular velocity in the equatorial plane that in one tropical year it will make exactly the same number of apparent revolutions around the earth as are made by the true sun. Time measured from the true noon is called **true**, or **apparent, solar time**; that from mean noon is called **mean time**. The excess of mean time over true time is called **equation of time**. The earth has been divided into a series of time zones, each 15° of longitude in width, so that intercourse may be facilitated by all places in each zone using the mean time corresponding to the center of the zone; this is known as **standard time**. The first zone is centered on Greenwich, England.

Titer.—See Concentration.

Torque.—The moment of a force.

Tropical month.—The yearly average of the time required for the moon to traverse 360° of astronomical longitude.

Twist.—If a uniform bar of free length l be clamped rigidly at one end and the other end be twisted, about the axis of the bar, through an angle θ , the twist of the bar is defined as θ/l . Similarly for other cases.

Units, Systems of.—The fundamental units in most absolute systems are those of mass, length, time, thermometric degree, and the dielectric constant (or the magnetic permeability) of a vacuum. Other units are defined in terms of these by the use of established relations, arbitrary factors being made unity.

The most common systems are the centimeter-gram-second-degree Centigrade (cgs), and the foot-pound-second-degree Fahrenheit (fps) systems. See also International electric units, practical electric units, and absolute.

Van der Waals.—See Waals.

Violle unit.—A superseded unit of luminous intensity based upon the brightness of fused platinum at the temperature of solidification.

Viscosity.—If a fluid is flowing in the plane yz with velocity v it exerts upon an adjacent plane a tangential drag $= \eta(dw)/(dz)$, per unit of area. η is called the **viscosity**, **coefficient of viscosity**, or **coefficient of internal friction**. Unit: poise.

Viscosity, Kinematic.—Viscosity divided by density.

Volt.—The electrical potential difference which, when steadily applied to a conductor having a resistance of one ohm, will produce in it a current of one ampere (cf. absolute and international units). The Int. Committee authorized by the London Conference, 1908, agreed to regard the emf of the Weston normal cell at 20°C as exactly 1.0183 Int. volts. This furnishes a subsidiary definition which is slightly discordant with the primary one. These tables distinguish between the two, and between units derived from them, by using (α) to denote those based on ampere and ohm, and (ν) to denote those based on volt as defined by the Weston cell.

Volt-electronic charge.—Analogous to volt-faraday.

Volt-faraday.—The work which must be done in order to transfer one faraday of positive electricity from any point to another having a potential one volt higher than the former.

Volt-second.—Unit of flux of magnetic induction. The amount defined by the change per second, of the magnetic induction through an area, required to induce around the area an emf of one volt.

Volume, Specific.—Reciprocal of the density.

Waals, Van der.—In the equation $(p + a/v^2)(v - b) = 1 + \alpha t$, a and b are known as Van der Waals' constants; $a(b) = \text{pressure [volume] constant}$.

Watt.—Unit of power; work done at rate of one joule per second.

Watt-hour.—Work expended by one watt in one hour (cf. kilowatt-hour).

Wave-length.—(λ). Distance between consecutive corresponding points in a monofrequent wave train. Occasionally applied to complex waves.

Wave number.—Reciprocal of wave-length.

Weight.—The force with which a body, left to itself, is urged towards the earth. In the absolute systems of units it is numerically equal to the mass of the body multiplied by the acceleration of gravity (g) at the position considered; hence varies with position. Such expressions as **gram weight** [pound weight] are to be interpreted as meaning the weight of a gram [a pound] at a place where g has the standard value, 980.665 cm/sec.²

Wien's displacement constant.—(w). See Black body.

Year.—(yr). Time required for earth to make one complete circuit of its orbit, as defined by its return to the same position as determined by the sun and some celestial point of reference. For the **tropical**, **equinoctial**, or **ordinary year** the reference point is the mean vernal equinox; for the **sidereal**, or **true**, year, it is a fixed star; for **anomalous year**, it is perihelion of earth's orbit; for **eclipse year**, it is ascending node of moon's orbit.

Young's modulus.—If a bar of uniform section be subjected to a longitudinal tension, the ratio of this stress to the resulting elongation per unit of length is called its **Young's modulus**. Also called **modulus of elasticity**, **elastic modulus**, **longitudinal elasticity**, **coefficient of resistance to extension**, **modulus of traction**.

ELEMENTS AND ATOMS

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ATOMIC WEIGHTS

The values given in column four were compiled for International Critical Tables (I. C. T.) by Prof. G. P. Baxter in 1923 and are those upon which all the data given in International Critical Tables are based.

Following these are shown the accepted atomic weights back to 1882. For the period since 1903 these are taken from the reports of the International Committee on Atomic Weights; for the period 1894 to 1903, from the reports of the American Chemical Society's Committee on Atomic Weights; for the year 1882, from F. W. Clarke's "A Recalculation of the Atomic Weights," reproduced in the first (1883) edition of "Landolt-Bornstein." These 1882 values (to two decimals) are given in parentheses. A date in parentheses indicates the first appearance of the element in the atomic weight table. All the values given are based upon O = 16.000

Symbol	Atomic number	Name	I. C. T. at. wt.	Atomic weights (1925-1882)
A	18	Argon	39.91	'25-'00, 39.91; '24-'19, 39.9; '18-'11, 39.88; '10-'03, 39.9; '02, 39.96 (1902)
Ac	89	Actinium	?	
Ag	47	Silver	107.880	'25, 107.880; '24-'09, 107.88; '08-'03, 107.93; '02-'91, 107.92 (107.92)
Al	13	Aluminium	26.96	'25, 26.97; '24-'22, 27.0; '21-'00, 27.1; '99-'96, 27.11; '95-'94, 27 (27.08)
As	33	Arsenic	74.96	'25-'10, 74.96; '09-'00, 75.0; '99-'97, 75.01; '96, 75.09; '95-'94, 75.0 (75.09)
Au	79	Gold	197.2	'25-'00, 197.2; '99-'97, 197.23; '96, 197.21; '95-'94, 197.3 (196.61)
B	5	Boron	10.82	'25, 10.82; '24-'19, 10.9; '18-'00, 11.0; '99-'96, 10.95; '95-'94, 11 (10.97)
Ba	56	Barium	137.37	'25-'09, 137.37; '08-'00, 137.40; '99-'94, 137.43 (137.01)
Be	4	Beryllium	9.02	'25, 9.02; '24-'00, 9.1; '99-'96, 9.08; '95-'94, 9 (9.11)
Bi	83	Bismuth	209.00	'25-'22, 209.0; '21-'07, 208.0; '06-'03, 208.5; '02-'00, 208.1; '99-'96, 208.11; '95, 208; '94, 208.9 (208.00)
Br	35	Bromine	79.916	'25, 79.916; '24-'09, 79.92; '08-'03, 79.96; '02-'04, 79.95 (79.95)
C	6	Carbon	12.000	'25, 12.000; '24-'16, 12.005; '15-'08, 12.00; '97-'96, 12.01; '95-'94, 12 (12.00)
Ca	20	Calcium	40.07	'25-'12, 40.07; '11-'00, 40.09; '08-'00, 40.1; '99-'97, 40.07; '96, 40.08; '95-'94, 40 (40.08)
Cb	41	Columbium	93.1	'25-'17, 93.1; '16-'00, 93.5; '08-'03, 94; '02-'00, 93.7; '99-'97, 93.73; '96-'94, 94.0 (94.03)
Cd	48	Cadmium	112.41	'25, 112.41; '24-'00, 112.40; '08-'00, 112.4; '99, 112.38; '98-'97, 111.95; '96, 111.93; '95-'94, 112 (112.00)
Ce	58	Cerium	140.25	'25-'04, 140.25; '03, 140; '02-'00, 139; '99-'98, 139.35; '97-'94, 140.25 (140.75)
Cl	17	Chlorine	35.458	'25, 35.457; '24-'00, 35.46; '08-'94, 35.45 (35.45)
Co	27	Cobalt	58.97	'25, 58.94; '24-'09, 58.97; '08-'00, 59.0; '99-'98, 58.99; '97, 58.93; '96, 58.95; '95, 59.5; '94, 59 (59.02)
Cp	71	Cassiopeium	175.0	See Lu
Cr	24	Chromium	52.01	'25, 52.01; '24-'10, 52.0; '09-'00, 52.1; '99-'96, 52.14; '95-'94, 52.1 (52.13)
Cs	55	Cesium	132.81	'25-'09, 132.81; '08-'04, 132.9; '03, 133.0; '02-'00, 132.9; '00-'96, 132.89; '95-'94, 132.9 (132.92)
Ct	72	Celtium		Same as Hf
Cu	29	Copper	63.57	'25-'09, 63.57; '08-'94, 63.6 (63.32)
Ds	66	Dysprosium	162.52	'25, 162.52; '24-'08, 162.5 (1908)
Er	68	Erbium	167.7	'25-'12, 167.7; '11-'09, 167.4; '08-'00, 166.0; '99-'97, 166.32; '96-'94, 166.3 (166.27)
Eu	63	Europium	152.0	'25-'07, 152.0 (1907)
F	9	Fluorine	19.00	'25-'03, 19.0; '02-'00, 19.05; '99-'97, 19.06; '96, 19.03; '95-'94, 19 (19.03)
Fe	26	Iron	55.84	'25-'12, 55.84; '11-'09, 55.85; '08-'01, 55.9; '00, 56.0; '99-'96, 56.02; '95-'94, 56 (56.04)
Ga	31	Gallium	69.72	'25, 69.72; '24-'19, 70.1; '18-'09, 69.9; '08-'00, 70.0; '99-'97, 69.91; '96-'94, 69.0 (68.96)
Gd	64	Gadolinium	157.26	'25, 157.26; '24-'09, 157.3; '08-'03, 156; '02, 156.4; '01-'00, 157.0; '99-'97, 156.76; '96-'94, 156.1

Symbol	Atomic number	Name	I. C. T. at. wt.	Atomic weights (1925-1882)	Symbol	Atomic number	Name	I. C. T. at. wt.	Atomic weights (1925-1882)
Ge	32	Germanium	72.38	'25, 72.60; '24-'00, 72.5; '99-'97, 72.48; '96-'94, 72.3	Nd	60	Neodymium	144.27	'25, 144.27; '24-'0 144.3; '08-'99, 143. '98-'97, 140.80; '96-'9 140.5
Gl	4	Glucinium	9.02	See Be	Ne	10	Neon	20.2	'25-'09, 20.2; '10-'0 20.0 (1904)
H	1	Hydrogen	1.0077	'25, 1.0077; '24-'04, 1.008 (1.00)	Ni	28	Nickel	58.69	'25, 58.69; '24-'09, 58.6 '08-'00, 58.7; '99-'9 58.69; '95-'94, 58. (58.06)
He	2	Helium	4.00	'25-'16, 4.00; '15-'11, 3.99; '10-'03, 4.0; '02, 3.96 (1902)	Nt	86	Niton	222.	See Rn
Hf	72	Hafnium	178.6		O	8	Oxygen	16.000	'25-'94, 16.000 (16.00)
Hg	80	Mercury	200.61	'25, 200.61; '23-'12, 200.6; '11-'94, 200.0 (200.17)	Os	76	Osmium	190.8	'25, 190.8; '23-'09, 190.8 '08-'00, 191.0; '99-'96 190.99; '95-'94, 190. (198.95?)
Ho	67	Holmium	163.4	'25, 163.4; '23-'13, 163.5 (1913)	P	15	Phosphorus	31.024	'25, 31.027; '24-'11 31.04; '10-'00, 31.0 '99-'94, 31.02; '95-'94 31 (31.03)
I (J)	53	Iodine	126.932	'25, 126.932; '24-'09, 126.92; '08-'05, 126.97; '04-'94, 126.85 (126.85)	Pa	91	Protoactinium	?	
In	49	Indium	114.8	'25-'09, 114.8; '08-'05, 115; '04-'00, 114; '99-'97, 113.85; '96-'91, 113.7 (113.66)	Pb	82	Lead	207.20	'25-'16, 207.20; '15-'08 207.10; '08-'03, 206.8 '02-'96, 206.92; '95-'94 206.95 (206.95)
Ir	77	Iridium	193.1	'25-'09, 193.1; '08-'03, 193.0; '02-'00, 193.1; '99-'96, 193.12; '95-'94, 193.1 (193.09)	Pd	46	Palladium	106.7	'25-'09, 106.7; '08-'03 106.5; '02-'00, 107.0 '99-'96, 106.36; '95 106.5; '94, 106.6 (105.98)
K	19	Potassium	39.095	'25, 39.096; '24-'09, 39.10; '08-'03, 39.15; '02-'94, 39.11 (39.11)	Po	84	Polonium	(210)	
Kr	36	Krypton	82.9	'25, 82.9; '24-'11, 82.92; '10, 83.0; '09-'03, 81.8; '02, 81.76 (1902)	Pr	59	Praseodymium	140.92	'25, 140.92; '24-'16 140.9; '15-'09, 140.6 '08-'00, 140.5; '99-'97 143.60; '96-'94, 143.5
La	57	Lanthanum	138.91	'25, 138.90; '24-'09, 139.0; '08-'03, 138.9; '02-'00, 138.6; '99-'97, 138.64; '96, 138.6; '95-'94, 138.2 (138.84)	Pt	78	Platinum	195.23	'25, 195.23; '24-'11 195.2; '10-'09, 195.0 '08-'03, 194.8; '02-'00, 194.9; '99-'96, 194.80; '95-'94, 195 (194.87)
Li	3	Lithium	6.939	'25, 6.940; '24-'11, 6.94; '10-'09, 7.00; '08-'96, 7.03; '95-'94, 7.02 (7.02)	Ra	88	Radium	225.95	'25, 225.95; '24-'16, 226; '15-'09, 226.4; '08-'03, 225 (1903)
Lu	71	Lutecium	175.0	'25-'16, 175.0; '15-'09, 174.0 (1909)	Rb	37	Rubidium	85.44	'25, 85.44; '24-'09, 85.45; '08-'05, 85.5; '04-'00, 85.4; '99-'96, 85.43; '95-'94, 85.5 (85.53)
Ma	43	Masurium			Re	75	Rhenium		
Mg	12	Magnesium	24.32	'25-'09, 24.32; '08-'03, 24.36; '02-'00, 24.3; '99-'97, 24.28; '96, 24.29; '95-'94, 24.3 (24.01)	Rh	45	Rhodium	102.91	'25, 102.91; '24-'09, 102.9; '08-'00, 103.0; '99-'96, 103.01; '95-'94, 103 (104.29)
Mn	25	Manganese	54.93	'25-'09, 54.93; '08-'00, 55.0; '99-'96, 54.99; '95-'94, 55 (54.03)	Rn	86	Radon	222	'25, 222; '24-'12, 222.4 (1912)
Mo	42	Molybdenum	96.0	'25-'00, 96.0; '99-'97, 95.99; '96, 95.98; '95-'94, 96 (95.75)	Ru	44	Ruthenium	101.7	'25-'00, 101.7; '99-'96, 101.68; '95-'94, 101.6 (104.46?)
N	7	Nitrogen	14.008	'25-'19, 14.008; '18-'07, 14.01; '06-'96, 14.04; '95, 14.05; '94, 14.03 (14.03)	S	16	Sulfur	32.065	'25, 32.065; '24-'16, 32.06; '15-'09, 32.07; '08-'03, 32.06; '02-'96, 32.07; '95-'94, 32.06 (32.06)
Na	11	Sodium	22.997	'25, 22.997; '24-'09, 23.00; '08-'94, 23.05 (23.05)	Sa	62	Samarium	150.43	'25, 150.43; '24-'09, 150.4; '08-'05, 150.3;
Nb	41	Niobium	93.1	See Cb					

Symbol	Atomic number	Name	I. C. T. at. wt.	Atomic weights (1925-1882)	Symbol	Atomic number	Name	I. C. T. at. wt.	Atomic weights (1925-1882)
Sm	62	Samarium	150.43	'04-'03, 150; '02-'00, 150.3; '99-'97, 150.26; '96-'94, 150.0	W	74	Tungsten	184.0	'25-'00, 184.0; '09-'97, 184.83; '96, 184.84; '05, 184.9; '04, 184 (184.03)
Sb	51	Antimony	121.77	'25, 121.77; '24-'03, 120.2; '02-'00, 120.4; '99-'96, 120.43; '95-'94, 120 (120.23)	Xe	54	Xenon	130.2	'25-'11, 130.2; '10, 130.7; '09-'02, 128 (1902)
Sc	21	Scandium	45.10	'25-'21, 45.10; '20-'00, 44.1; '99-'97, 44.12; '96-'94, 44.0 (44.08)	Y Yt	39	Yttrium	89.0	'25, 88.9; '24-'19, 89.83; '18-'16, 88.7; '15-'00, 89.0; '99-'97, 89.02; '96, 88.95; '05-'94, 89.1 (90.02?)
Se	34	Selenium	79.2	'25-'00, 79.2; '99, 79.17; '98-'97, 79.02; '96-'94, 79.0 (78.98)	Yb	70	Ytterbium	173.6	'25, 173.6; '24-'16, 173.5; '15-'00, 172.0; '08-'03, 173; '02-'00, 173.2; '99-'97, 173.19; '96-'94, 173.0 (173.16)
Si	14	Silicon	28.06	'25, 28.06; '24-'22, 28.1; '21-'00, 28.3; '08-'94, 28.4 (28.26)	Zn	30	Zinc	65.38	'25, 65.38; '24-'10, 65.37; '00, 65.7; '08-'00, 65.4; '99-'96, 65.41; '05-'94, 65.3 (65.05)
Sm	62	Samarium	150.43	See Sa	Zr	40	Zirconium	91	'25, 91; '24-'09, 90.6; '01-'97, 90.4; '96-'94, 90.6 (89.57)
Sn	50	Tin	118.70	'25-'16, 118.70; '15-'00, 119.0; '99-'96, 119.05; '95-'94, 119 (117.97)					
Sr	38	Strontium	87.62	'25-'11, 87.63; '10-'09, 87.62; '08-'00, 87.6; '99-'96, 87.61; '95, 87.60; '94, 87.6 (87.58)					
Ta	73	Tantalum	181.5	'25-'10, 181.5; '11-'07, 181.0; '06-'03, 183; '02-'00, 182.8; '99-'97, 182.84; '96-'94, 182.6 (182.56)					
Tb	65	Terbium	159.2	'25-'07, 159.2; '06-'94, 160					
Te	52	Tellurium	127.5	'25-'09, 127.5; '08-'03, 127.6; '02, 127.7; '01-'00, 127.5; '99-'97, 127.49; '96, 127; '95-'94, 125 (128.252)					
Th	90	Thorium	232.15	'25-'19, 232.15; '18-'11, 232.4; '10-'09, 232.42; '08-'03, 232.5; '02-'00, 232.6; '99-'96, 232.63; '95-'94, 232.6 (233.95)					
Ti	22	Titanium	47.9	'25-'03, 48.1; '02-'96, 48.15; '95-'94, 48 (49.96?)					
Tl	81	Thallium	204.4	'25, 204.39; '24-'09, 204.0; '08-'03, 204.1; '02-'96, 204.15; '95-'94, 204.18 (204.18)					
Thulium	69	Thulium	169.4	'25, 169.4; '24-'22, 169.9; '21-'09, 168.5; '08-'03, 171; '02-'94, 170.7					
U	92	Uranium	238.17	'25, 238.17; '24-'16, 238.2; '15-'03, 238.5; '02-'00, 239.6; '99-'96, 239.59; '95-'94, 239.6 (239.03)					
Uranium-X ₂	91	Uranium-X ₂	(234)	Isotope of Pa					
Vanadium	23	Vanadium	50.96	'25, 50.96; '24-'12, 51.0; '11, 51.06; '10-'03, 51.2; '02-'00, 51.4; '99-'96, 51.38; '95-'94, 51.4 (51.37)					

TABLE OF ISOTOPES						
F. W. ASTON						
Element	Atomic number	I. C. T. atomic weight	Minimum number of isotopes	Mass numbers in order of the intensities of the mass-spectrum lines	Lit.	
A	18	39.91	2	40, 36	(3, 5, 21)	
Ag	47	107.880	2	107, 109	(15, 26)	
Al	13	26.96	1	27	(10)	
As	33	74.96	1	75	(4, 22)	
B	5	10.82	2	11, 10	(4, 22)	
Ba	56	137.37	1	138, 136	(17, 18)	
Be	4	9.02	1	9	(23)	
Bi	83	209.00	1	209	(19)	
Br	35	79.916	2	79, 81	(4, 22)	
C	6	12.000	1	12	(2, 21)	
Ca	20	40.07	2	40, 44	(31, 32)	
Cd	48	112.41	6	110, 111, 112, 113, 114, 116	(19)	
Ce	58	140.25	2	140, 142	(18)	
Cl	17	35.458	2	35, 37	(2, 21, 23)	
Co	27	58.97	1	59	(15, 26)	
Cr	24	52.01	1	52	(15, 26)	
Cs	55	132.81	1	133	(6, 24)	
Cu	29	63.57	2	63, 65	(14, 26)	
F	9	19.00	1	19	(4, 22)	
Fe	26	55.84	2	56, 54	(9, 17)	
Ga	31	69.72	2	69, 71	(15, 26)	
Ge	32	72.38	3	74, 72, 70	(13, 26)	
Gl	4	9.02	1	9	(23)	
H	1	1.0077	1	1	(3, 21)	
He	2	4.00	1	4	(3, 21)	
Hg	80	200.61	2, 6	197-200, 202, 204	(2, 3, 21)	
I	53	126.932	1	127	(5, 23)	
In	49	114.8	1	115	(16)	
K	19	39.095	2	39, 41	(6, 24)	
Kr	36	82.9	6	84, 86, 82, 83, 80, 78	(3, 21)	
La	57	138.91	1	139	(17)	

Continued on p. 47.

Continued on p. 47.

PERIODIC CHART OF THE ELEMENTS WITH ATOMIC NUMBERS AND ATOMIC WEIGHTS

I	II	III	IV	V	VI	VII	VIII or 0	*	La ⁵⁷ 138.91	Ce ⁵⁸ 140.25	Pr ⁵⁹ 140.92
H ¹ 1.0077							He ² 4.00				
Li ³ 6.939	Be ⁴ 9.02	B ⁵ 10.82	C ⁶ 12.00	N ⁷ 14.008	O ⁸ 16.000	F ⁹ 19.00	Ne ¹⁰ 20.2	Gd ⁶⁰ 157.26	Tb ⁶¹ 159.2	Dy ⁶² 162.52	Ho ⁶³ 163.4
Na ¹¹ 22.997	Mg ¹² 24.32	Al ¹³ 26.96	Si ¹⁴ 28.06	P ¹⁵ 31.024	S ¹⁶ 32.065	Cl ¹⁷ 35.458	Ar ¹⁸ 39.91	Er ⁶⁴ 167.7	Tm ⁶⁵ 169.4	Yb ⁶⁶ 173.6	Lu ⁶⁷ 175.0
K ¹⁹ 39.095	Ca ²⁰ 40.07	Sc ²¹ 45.10	Ti ²² 47.9	V ²³ 50.96	Cr ²⁴ 52.01	Mn ²⁵ 54.93		Fe ²⁶ 55.84	Co ²⁷ 58.97	Ni ²⁸ 58.69	
	Cu ²⁹ 63.57	Zn ³⁰ 65.38	Ga ³¹ 69.72	Ge ³² 72.38	As ³³ 74.96	Se ³⁴ 79.2	Br ³⁵ 79.916	Kr ³⁶ 83.8			
Rb ³⁷ 85.47	Sr ³⁸ 87.62	Yt ³⁹ 89.0	Zr ⁴⁰ 91	Nb ⁴¹ 93.1	Mo ⁴² 96.0	Tc ⁴³ 98.0			Ru ⁴⁴ 101.7	Rh ⁴⁵ 102.91	Pd ⁴⁶ 106.7
	Ag ⁴⁷ 107.880	Cd ⁴⁸ 112.41	In ⁴⁹ 114.8	Sn ⁵⁰ 118.70	Sb ⁵¹ 121.77	Te ⁵² 127.5	I ⁵³ 126.932	Xe ⁵⁴ 131.29			
Cs ⁵⁵ 132.81	Ba ⁵⁶ 137.37	*La ⁵⁷ 138.91	Hf ⁵⁸ (178.6)	Ta ⁵⁹ 181.5	W ⁶⁰ 184.0	Re ⁶¹ 186.2			Os ⁷⁶ 190.8	Ir ⁷⁷ 193.1	Pt ⁷⁸ 195.23
	Au ⁷⁹ 197.2	Hg ⁸⁰ 200.61	Tl ⁸¹ 204.4	Pb ⁸² 207.20	Bi ⁸³ 209.00	Po ⁸⁴ (210)					
	Ra ⁸⁸ 226	Ac ⁸⁹	Th ⁹⁰ 232.15	Pa ⁹¹	U ⁹² 238.17						

* Indicates rare earths. See above

α - ray ←			THE RADIOACTIVE ELEMENTS FREDERICK SODDY							→ β - ray (or rayless)			
Group	III	IV	V	VI	VII	VIII or 0	I	II	III	IV	V	VI	
Principal element	Tl	Pb	Bi	Po	—	Rn	—	Ra	Ac	Th	Pa	U	
Atomic number	81	82	83	84	85	86	87	88	89	90	91	92	
U-Ra Series													
Th Series													
Ac Series													

TABLE OF ISOTOPES.—Continued

Element	Atomic number	I. C. T. atomic weight	Minimum number of isotopes	Mass numbers in order of the intensities of the mass-spectrum lines	Lit
Li	3	6.939	2	7, 6	(24, 27, 29, 30)
Mg	12	24.32	3	24, 25, 26	(28, 30)
Mn	25	54.93	1	55	(15, 26)
N	7	14.008	1	14	(3, 21)
Na	11	22.997	1	23	(6, 24)
Nd	60	144.27	3	142, 144, 146, 145	(17, 18)
Ne	10	20.2	2	20, 22	(1, 20, 21)
Ni	28	58.69	2	58, 60	(7)
O	8	16.000	1	16	(2, 21)
P	15	31.024	1	31	(4, 22)
Pr	59	140.92	1	141	(17)
Rb	37	85.41	2	85, 87	(6, 24)
S	16	32.065	1	32	(4, 22)
Sb	51	121.77	2	121, 123	(11, 25)
Sc	21	45.10	1	45	(15, 26)
Se	34	79.2	6	80, 78, 76, 82, 77, 74	(10)
Si	14	28.06	3	28, 29, 30	(4, 18, 22)
Sn	50	118.70	7, 8	120, 118, 116, 124, 119, 117, 122, 121	(8)
Br	38	87.62	2	88, 86	(15, 17, 26)
Te	52	127.5	3	128, 130, 126	(19)
Ti	22	47.9	1	48	(15, 26)
V	23	50.96	1	51	(15, 26)
Xe	54	130.2	7, 9	129, 132, 131, 134, 136, 128, 130, 126, 124	(3, 5, 10, 21, 23)
Yt	39	89.0	1	89	(15, 26)
Zn	30	65.38	4	64, 66, 68, 70	(31)
Zr	40	91	3	90, 94, 92	(18)

LITERATURE

(For a key to the periodicals see end of volume)

- 1) Aston, 58, 104: 334, 10. (2) *Ibid.*, 104: 393, 10. (3) *Ibid.*, 105: 8; 20. (4) *Ibid.*, 105: 347; 20. (5) *Ibid.*, 106: 468, 20. (6) *Ibid.*, 107: 72, 21. (7) *Ibid.*, 107: 520; 21. (8) *Ibid.*, 109: 843; 22. (9) *Ibid.*, 110: 312, 22. 1) Aston, 58, 110: 664; 22. (11) *Ibid.*, 110: 732; 22. (12) *Ibid.*, 111: 739, 23. (13) *Ibid.*, 111: 771, 23. (14) *Ibid.*, 112: 162; 23. (15) *Ibid.*, 112: 419, 23. (16) *Ibid.*, 113: 192; 24. (17) *Ibid.*, 113: 856; 24. (18) *Ibid.*, 114: 273, 24. (19) *Ibid.*, 114: 717, 24. 1) Aston, 5, 39: 449, 20. (21) *Ibid.*, 39: 611; 20. (22) *Ibid.*, 40: 628, 20. (23) *Ibid.*, 42: 140; 21. (24) *Ibid.*, 42: 436; 21. (25) *Ibid.*, 43: 924, 23. (26) *Ibid.*, 47: 385; 24. (27) Aston and Thomson, 58, 106: 827; 21. (28) Dempster, 166, 52: 559, 20. (29) Dempster, 166, 52: 363, 21. (30) Dempster, 2, 18: 415, 21. (31) *Ibid.*, 19: 431, 22. (32) *Ibid.*, 20: 631, 22. (33) Thomson, 3, 42: 837, 21.

THE STRUCTURE OF THE ISOLATED ATOM

(Symbols, p. 50)

H. A. KRAMERS

According to the fundamental postulates of Bohr's atomic theory, a series of discrete "stationary states" has to be correlated to each atom. A definite "energy-content" can be assigned to every state, and an atom in a given state can change its energy only by performing a process of "transition" to another state. The emission of a spectral line of frequency ν is correlated with a spontaneous transition from a stationary state of energy content E_1 to another of energy content E_2 by equation (1)

$$\nu = \frac{1}{h} (E_1 - E_2) \quad (1)$$

The stationary state with the smallest energy is termed the "normal state" of the atom. The properties of the stationary states can, to a considerable extent, be accounted for by assuming that the electrons surrounding the nucleus have definite motions, characterized by integral values of certain quantities. These integers are called the "quantum numbers" of the stationary state in question; by their values the energy of the state is completely fixed. For general treatment of the subject, see (1, 3, 4, 10, 11, 18).

Of special interest are the recent attempts (21) to develop a rational "quantum mechanics" of the atom. This work clearly demonstrates the limited applicability of a picture of atomic structure, in which the behavior of the electrons inside the atom is visualized by orbits possessing definite kinematical properties.

Atoms Containing One Electron.—Only for atoms containing a single electron, can a fairly complete description of the electronic motion in the stationary state, and of the significance of the quantum numbers be given. The motion of the electron obeys quite approximately the laws of electrodynamics, and can be described as a Keplerian elliptic motion, with the centre of gravity of the nucleus and the electron in one focus. On this motion, a slow uniform precession in the plane of motion is superposed (effect of variability of mass or "relativity-effect"). Two quantum numbers (n, k) define the stationary states ($n, k = 1, 2, 3, \dots$; $k < n$), k/n being the ratio of the minor to the major axis of the ellipse. The states are denoted by the symbol n_k .

In the normal state, $1/(n - k - 1)$, the orbit is circular; and, omitting the correction due to the relativity effect, its constants are given by equations (2)

$$\begin{aligned} a_1 &= \frac{1}{Z} \cdot \frac{h^2}{4\pi^2 e^4 m_0} \cdot \frac{1}{Z} = \frac{0.53}{Z} \times 10^{-8} \text{ cm} \\ \omega_1 &= \frac{Z^2}{1 + \frac{m_0}{M}} \times \frac{4\pi^2 e^4 m_0}{h^3} \cdot \frac{2\nu}{1 + \frac{m_0}{M}} = \frac{6.6Z^2}{1 + \frac{m_0}{M}} \times 10^{15} \text{ sec}^{-1} \\ W_1 &= \frac{Z^2}{1 + \frac{m_0}{M}} \times \frac{2\pi^2 e^4 m_0}{h^3} = \frac{Z^2 \nu}{1 + \frac{m_0}{M}} = \frac{2.15Z^2}{1 + \frac{m_0}{M}} \times 10^{-11} \text{ erg.} \end{aligned} \quad (2)$$

In higher quantum states, the orbital constants are, with the same approximation, given by (3, 4):

$$\begin{aligned} a_n &= n^2 a_1 = \frac{n^2}{Z} r_1 \\ \omega_n &= \frac{\omega_1}{n^3} = \frac{2Z^2 \nu}{n^3 \left(1 + \frac{m_0}{M}\right)} \end{aligned} \quad (3)$$

$$\begin{aligned} W_n &= \frac{W_1}{n^2} = \frac{Z^2 \nu}{n^2 \left(1 + \frac{m_0}{M}\right)} \\ b_{n,k} &= n k a_1 = \frac{n k r_1}{Z}; \quad p_k = k^2 a_1 = \frac{k^2 r_1}{Z} \end{aligned} \quad (4)$$

The number of revolutions corresponding to one rotation of the major axis, is, to a first approximation, given by (5):

$$\begin{aligned} \omega_n &= \frac{k^2}{Z^2} \times \frac{2}{\alpha^2} = \frac{k^2}{Z^2} \times 37,700 \\ \left(\alpha = \frac{2\pi e^2}{hc} = 7.30 \times 10^{-3} \cong \frac{1}{137}; \alpha^2 = 5.31 \times 10^{-6} \right) \end{aligned} \quad (5)$$

The exact energy formula, neglecting terms containing m_0/M , is given by (6):

$$\begin{aligned} W_{n,k} &= m_0 c^2 \left[\left\{ 1 + \left(\frac{\alpha Z}{n - k + \sqrt{k^2 - \alpha^2 Z^2}} \right)^2 \right\}^{-1/2} - 1 \right] \\ &= \frac{Z^2}{n^2} \times \frac{2\pi^2 e^4 m_0}{h^3} \left\{ 1 + \alpha^2 Z^2 \left(\frac{1}{k n} - \frac{3}{4 n^2} \right) + \dots \right\} \end{aligned} \quad (6)$$

(For general formula for W , including terms in m_0/M , see (9).) Figure 1 illustrates the stationary states in the hydrogen atom for which $n = 1, 2, 3, 4$. The arrows indicate the transitions giving

rise to the fine-structure components of the spectral lines, H_α and H_β . The numerical constants for these states are given in Table 1.

TABLE 1.—HYDROGEN ORBITS; $r_1 = 5.286 \times 10^{-9}$ cm ⁽¹⁾

n_k	a/r_1	b/r_1	p/r_1	$\omega \times 10^{-14}$	$\sigma \times 10^{-8}$	ω/σ
1 ₁	1	1	1	65.78	1746	37 700
2 ₁	4	2	1	8.222	218.3	37 700
2 ₂	4	4	4	8.222	51.57	150 700
3 ₁	9	3	1	2.436	64.68	37 700
3 ₂	9	6	4	2.436	16.17	150 700
3 ₃	9	9	9	2.436	7.187	339 300
4 ₁	16	4	1	1.029	27.29	37 700
4 ₂	16	8	4	1.029	6.822	150 800
4 ₃	16	12	9	1.029	3.032	339 300
4 ₄	16	16	16	1.029	1.705	603 200

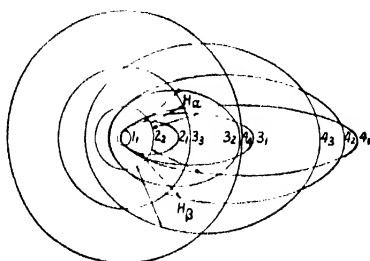


FIG. 1.—Orbits in hydrogen to $n = 4$. (Reproduced by permission from *The Journal of the Franklin Institute*.)

Atoms Containing More than One Electron.—A complete theory of stationary states is lacking. Many properties of these states can be accounted for, however, on the basis of the principles applied to atoms containing one electron. As a first approximation, each electron may be considered as moving in a central field of force due to the nucleus and the other electrons, its motion being characterized by a "principal quantum number" n and a "subordinate quantum number" k . The electronic orbit can be described as a plane periodic orbit on which a uniform precession in the plane is superposed ("central orbit" cf. Fig. 2).

If the position of the electron in the orbital plane is defined by polar coordinate (r, ϕ) , the quantum numbers are defined by Sommerfeld's quantum conditions (7)

$$k = \frac{2\pi m_0 \beta r^2}{h} \frac{d\phi}{dt} \approx \frac{2\pi P}{h} \quad (n - k) = \frac{1}{h} \oint m_0 \beta \left(\frac{dr}{dt} \right)^2 dt \quad (7)$$

where the factor β becomes equal to 1 if the relativity effect is neglected. P is equal to the angular momentum of the electron with respect to the nucleus; the integral has to be taken over a complete period of the radial motion, from A to B (Fig. 2).

In the **normal state** the electrons are distributed in groups, each of which is characterized by its quantum numbers (n, k) . On passing from the nucleus to the surface of the atom, the successive groups correspond to successive integral values of the main quantum number n ("n-quantum group"), the innermost group being characterized by $n = 1$; each group is divided into sub-groups corresponding to the different values which k may take. The possibility of reconciling such a picture with the dynamical properties of quantized central orbits is closely connected with the fact that in an orbit for which $k < n$ the electron will, in each revolution, dive into and leave again all regions occupied by

electronic orbits for which the principal quantum number is smaller than n but equal to or greater than k (conception of "penetrating orbits").

The maximum number of electrons which an n -quantum group can contain is equal to $2n^2$. If it contains this number, it contains sub-groups corresponding to all possible values for k ($k = 1, 2, \dots, n$), and it is said to be a "finally completed" group. If a group, due to the dynamical properties of the atom under consideration, contains only sub-groups corresponding to $k = 1,$

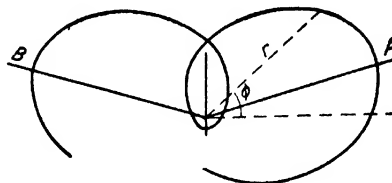


FIG. 2.—Central orbit.

2, . . . k_0 ($k_0 < n$) it will be in a state which is termed "provisionally completed," if it contains $2k_0^2$ electrons. For example, the 4-quantum group has reached the state of a 2-group ($k_0 = 1$) in Ca (20), the state of an 8-group or 8-shell ($k_0 = 2$) in Kr (36), the state of an 18-group or 18-shell ($k_0 = 3$) in Ag (47), and its final state of a completed 32-group or 32-shell ($k_0 = 4$) in Lu (71). With the exception of the 2-groups it seems impossible to assign definite values to the number of electrons in the several sub-groups of a provisionally, or finally, completed group; in fact, the actual properties of the electronic groups seem to show that the simple conception of central orbits characterized by the symbol n_k is essentially insufficient for their description. (Originally Bohr assumed that a group of $2k_0^2$ electrons contained $2k_0$ electrons in each sub-group.) Closely connected herewith is the impossibility of assigning definite spatial arrangements to the orbits belonging to one and the same group. In Table 2 the number of electrons in each group is given as far as the theory allows of a definite statement; those in parentheses are uncertain.

From calculations based on Sommerfeld's quantum conditions and certain simplifying assumptions, a rough estimate of the dimensions of the different types of orbits may be made. Such estimates for neutral atoms and for positive ions containing only finally, or provisionally, completed groups are schematically represented in Fig. 3. The small vertical lines are so drawn that their distances from the dot at the left are proportional to the radius of the sphere inside which the electrons belonging to the respective groups are moving. The symbols $g(n_1, 2, \dots, k_0)$ means that the corresponding groups contain g electronic orbits of principal quantum number n , and of subordinate quantum numbers from 1 to k_0 .

For the calculation of the dimensions of the outermost groups it has been necessary to consider also experimental data relative to the effective gas-kinetic radii of the atoms of the inert gases, the effective radii of ions in crystals, ionic refraction, etc. As a rule the effective radii are 1.5 to 2.5 times larger than the orbital dimensions. As regards the inner groups, the estimate is rather accurate; for the outer groups, errors of the order of 10% might be expected. Special mention must be made of the uncertainty in the radius of the 5-quantum group for elements heavier than barium; the radii of this group as given in Fig. 3 for the elements (72), 79, 80, 81, 82 are perhaps some 10% too high, as compared with radii of the homologous elements 47, 48, 49, 50.

For atoms containing only one electron in the outermost group, the dimensions of the orbit of this electron, and its frequency of revolution can with considerable accuracy be derived from the

TABLE 2

	1s	2s 2p	3s 3p 3d	4s 4p 4d 4f	5s 5p 5d 5f	6s 6p 6d 6f	7s
1 H	1						
2 He	2						
3 Li	2	1					
4 Be	2	2					
5 B	2	2 1					
6 C	2	2 (2)					
10 Ne	2	8					
11 Na	2	8	1				
12 Mg	2	8	2				
13 Al	2	8	2 1				
14 Si	2	8	2 (2)				
18 Ar	2	8	8				
19 K	2	8	8	1			
20 Ca	2	8	8	2			
21 Sc	2	8	8 1	(2)			
22 Ti	2	8	8 2	(2)			
29 Cu	2	8	18	1			
30 Zn	2	8	18	2			
31 Ga	2	8	18	2 1			
36 Kr	2	8	18	8			
37 Rb	2	8	18	8	1		
38 Sr	2	8	18	8	2		
39 Y	2	8	18	8 1	(2)		
40 Zr	2	8	18	8 2	(2)		
47 Ag	2	8	18	18	1		
48 Cd	2	8	18	18	2		
49 In	2	8	18	18	2 1		
54 Xe	2	8	18	18	8		
55 Cs	2	8	18	18	8	1	
56 Ba	2	8	18	18	8	2	
57 La	2	8	18	18	8 1	(2)	
58 Ce	2	8	18	18 1	8 1	(2)	
59 Pr	2	8	18	18 2	8 1	(2)	
71 Lu	2	8	18	32	8 1	(2)	
72 Hf	2	8	18	32	8 2	(2)	
79 Au	2	8	18	32	18	1	
80 Hg	2	8	18	32	18	2	
81 Tl	2	8	18	32	18	2 1	
86 Rn	2	8	18	32	18	8	
87 —	2	8	18	32	18	8	1
88 Ra	2	8	18	32	18	8	2
89 Ac	2	8	18	32	18	8 1	(2)
90 Th	2	8	18	32	18	8 2	(2)
118 —	2	8	18	32	32	18	8]

frequency of the lowest frequency term in the corresponding spectral series, provided we may adhere to the simple central orbit model. Figure 4 contains a schematic picture of the orbits of the outer electron in the normal state of neutral atoms of the alkali metals, and of Cu, Ag, Au. They are all penetrating orbits, since they correspond to $k = 1$. The regions inside which the electrons of the completed groups are moving are designated by circles. The atoms of the inert gases are added for the sake of comparison. The numbers at the left of the nucleus indicate the number of electrons contained in each group; the symbols $n_{1,2}$ at the right indicate the quantum numbers of the orbits contained in each group.

[For detailed calculations of electronic orbits, based on simplifying assumptions, see (12, 13, 20) (Cs and U); the work is semi-empirical. For detailed calculations on purely theoretical basis, see (15) (Ne, Na, Mg⁺, Al⁺⁺, Si⁺⁺⁺, P⁺⁺⁺⁺) and (16) (alkali metals); in Landsay's work, the radii of outer groups in K⁺, Rb⁺, and Cs⁺ seem too large, probably on account of inadequacy of assumptions regarding numbers of electrons in sub-groups, as well as of the simplifying assumptions made. For critical review of work on effective atomic radii, see (14) and for recent work (9). There is no simple direct connection between effective atomic radii and the magnitude of the space occupied by electronic orbits.]

In experiments on optical and X-ray spectra, we meet neutral atoms or atomic ions in **higher quantum states**. Several features of these states can be described on the simple central orbit model. In the case of "single excitation" all electronic orbits except one remain normal, and the other electron describes an orbit with quantum numbers which differ from those of the normal state. "Double excitation" corresponds to two electrons describing orbits different from those in the normal state, etc. We will here consider only singly-excited states.

In the stationary states (energy levels) involved in the emission of the ordinary X-ray spectra, one electron in the inner groups of the atom is lacking. In the states involved in the emission of the ordinary series-spectra, one electron belonging to the outermost group of the atom, the "series electron," moves in a central n_k orbit the dimensions of which are large as compared with those of the rest of the atom. It may move either quite outside the atomic residue or it may penetrate into it in each revolution.

As a first approximation, a non-penetrating orbit may be described as a Keplerian elliptical orbit performing a uniform precession in its plane, the shape of the ellipse being very nearly that of an n_k -orbit in an atom containing only one electron and having a nuclear charge Z^*e equal to the net-charge of the atomic residue. If the electron orbit is of the penetrating type, it may, as a first approximation, be described as a set of congruent outer Keplerian elliptical loops, connected by congruent inner loops, the angular distance between successive loops being the same. The semi-major axis, the semi-parameter p , and the semi-minor axis b of the outer loop can be found from the value of the corresponding spectral term (T) by means of the formulae

$$a = \frac{Z^* N r_1}{T}, \quad p = \frac{k^2}{Z^* r_1}, \quad b = \sqrt{ap} \quad (8)$$

where $N = \left(\frac{v_\infty}{c} \times \frac{1}{1 + m_0/M} \right)$ is the Rydberg constant for the element in question, and Z^*e is the net-charge of the atomic residue. If we introduce the effective quantum number n^* ($n^* = Z^* N / T$), these formulae may be written:

$$a = \frac{n^{*2}}{Z^* r_1}, \quad p = \frac{k^2}{Z^* r_1}, \quad b = \frac{n^* k}{Z^* r_1} \quad (9)$$

The greater the ratio n^*/k (or a/b) the closer the approximation to which this description of the outer loops may be considered to hold. The maximum distance of the electron from the nucleus is equal to $a + \sqrt{a^2 - b^2}$, or very nearly equal to $2a - \frac{1}{2}p$.

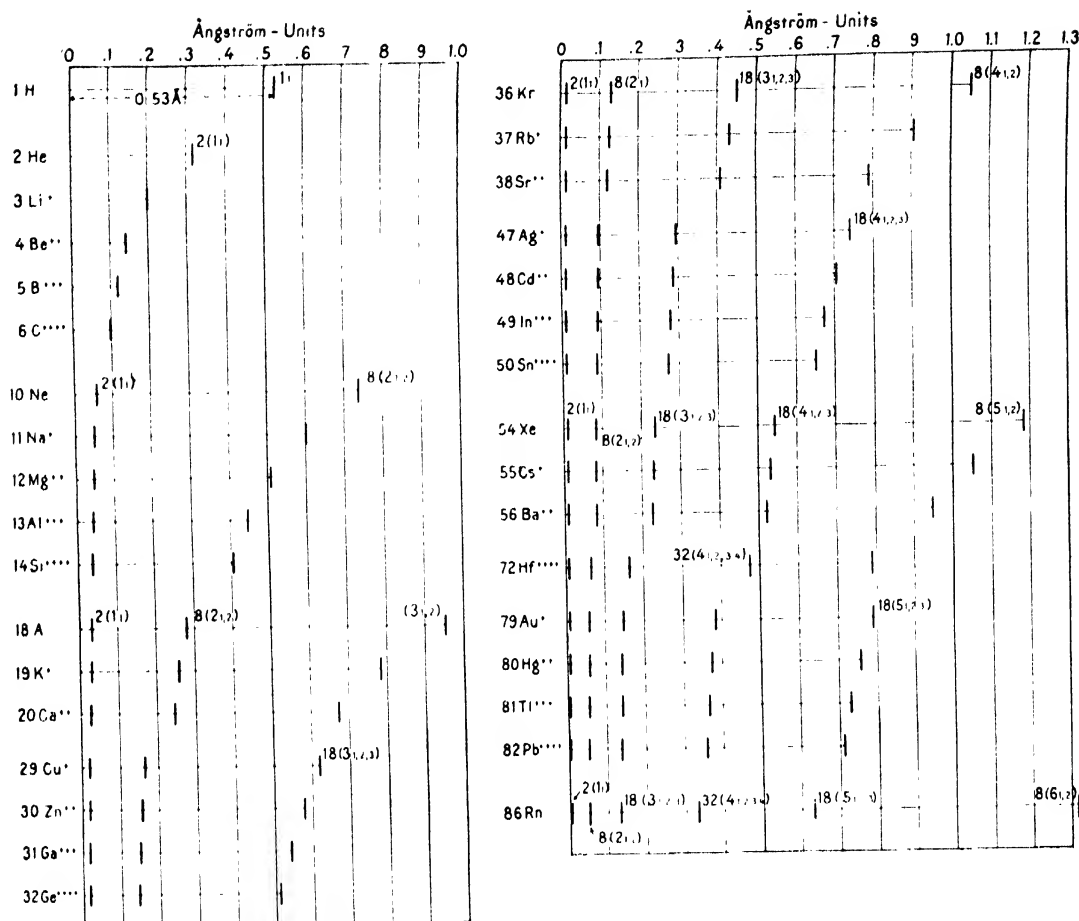


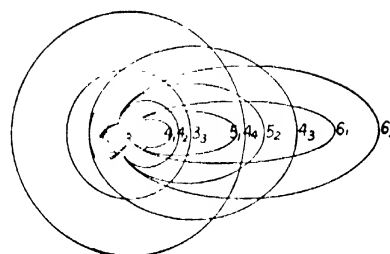
FIG. 3. Maximum elongations of electrons of several groups.

The values to be assigned to the precessional frequency characterizing the penetrating central orbits are very uncertain. For the alkali elements, the ratio ω/a for the n_1 orbits probably lies between 0.3 and 0.5, for the n_2 orbits (except lithium) between 0.5 and 1.0. Based on the above formulae, an illustration of the shapes of the orbits of the series electron corresponding to the stationary states of the K-atom, is given in Fig. 5. [For connection between spectra and the group structure of atoms, see (6, 5); for spectra and central field of force, see (12, 13); for series spectra and electronic orbits, see (2, 7); for recent development of formal theory of electronic groups, see (17, 19)].

SYMBOLS

The symbols c , e , h , m , λ have their usual significance (see p. 16); others which occur more than once are:

- a_n Semi-major axis of electronic orbit, state n .
- $b_{n,k}$ Semi-minor axis of electronic orbit, state n , k .
- k Subordinate, or azimuthal, quantum number defining a stationary state.
- M Nuclear mass
- n Principal quantum number defining a stationary state.

FIG. 5. - Orbits of the series electron of potassium. (Reproduced by permission from *The Journal of the Franklin Institute*.)

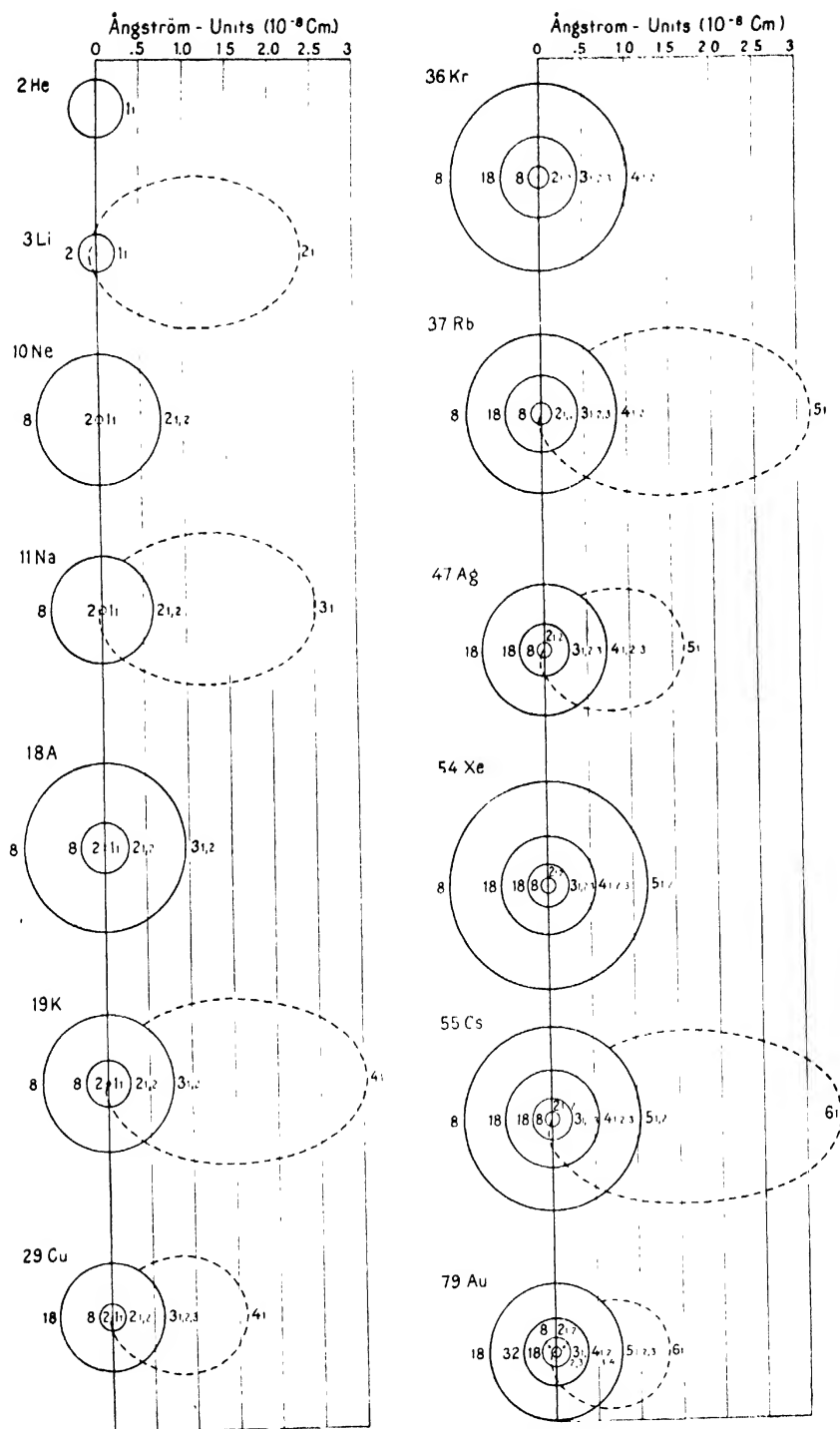


FIG. 4.—Normal orbit of outer electron.

n^*	Effective quantum number = Z^*N/T .
n_k	Designation of the state characterized by the numbers n, k .
N_∞	Rydberg constant.
p	Semi-parameter of the electronic orbit (semi-latus rectum).
r_1	Radius of first Bohr ring for hydrogen.
T	Spectral term = a wave number ($1/\lambda$) of a spectral series.
v	Speed of electron in its orbit
W_∞	Energy expenditure required to remove the electron to infinity.
Z	Atomic number; $Ze \rightarrow$ nuclear charge.
Z^*	Charge of atomic residue
α	$2\pi e^2/hc$.
β	$(1 - v^2/c^2)^{-1/2}$
ν	Frequency of emitted radiation.
ν_∞	Rydberg fundamental frequency.
$\omega_{n,k}$	Frequency of precession of electronic orbit.

ω_n Frequency of revolution of electron; for penetrating orbits, the radial frequency, one revolution being from A to B , Fig. 2.

LITERATURE

(For a key to the periodicals, see end of volume)

- (¹) Andrade, *The Structure of the Atom*, 1923. (²) Birge and Blackett, *48*, 8: 213; 24. (³) Bohr, *The Theory of Spectra and Atomic Constitution*, 2nd ed., 1924. (⁴) Bohr, *58*, 112: 29; 23. *218*, 11: 606; 23. (⁵) Bohr, *8*, 71: 228, 23. (⁶) Bohr and Coster, *96*, 12: 342; 23. (^{6a}) Born, *Vorlesungen über Atommechanik*. (⁷) Born and Heisenberg, *96*, 12: 388; 24. (⁸) Davy, *2*, 22: 211; 23. (⁹) Darwin, *3*, 29: 537; 23. (¹⁰) Foote and Mohler, *Origin of Spectra*, 1923. (¹¹) Foote, *145*, 198: 344, 517; 24. (¹²) Fuess, *96*, 11: 364; 22. *12*: 1; 22. *21*: 265; 24. *8*, 76: 209; 25. (¹³) Hartree, *201*, 11: 630; 23. *22*: 409, 464; 24. *8*, 106: 552; 24. (¹⁴) Hersfeld, *200*, 19: 259; 23. (¹⁵) Kramers and Urey, *O*. (¹⁶) Lindsay, *2*, 22: 552, 24. *28*, 3: 191; 24. *2*, 18: 239; 25. (¹⁷) Pauli, Jr., *96*, 11: 765; 25. (¹⁸) Sommerfeld, *Atombau und Spektrallinien*, 4th ed., 1925. (¹⁹) Stoner, *3*, 48: 719; 24. (²⁰) Urey, *O*. (²¹) Heisenberg, *96*, 12: 879, 25.

THERMOMETRY

E. F. MUELLER, L. H. ADAMS, F. O. FAIRCHILD AND H. T. WENSEL

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1. THERMOMETRIC SCALES

E. F. MUELLER

Centigrade or Celsius scale, °C

Fahrenheit scale, °F

Réaumur scale, °R

Centigrade absolute or Kelvin scale, °K

Fahrenheit absolute or Rankine scale, °R'

By definition or as basic values adopted for I. C. T., the ice and steam points under a pressure of $1A_n$ have the following values:

Ice point: $0^\circ\text{C} \approx 32^\circ\text{F} \approx 0^\circ\text{R} \approx 273.1^\circ\text{K} = 491.58^\circ\text{R}'$.

Steam point: $100^\circ\text{C} \approx 212^\circ\text{F} \approx 80^\circ\text{R} \approx 373.1^\circ\text{K} \approx 703.58^\circ\text{R}'$.

$^\circ\text{C} = \frac{5}{9} (^\circ\text{F} - 32) \approx \frac{5}{9} ^\circ\text{R} \approx ^\circ\text{K} - 273.1$.

$^\circ\text{F} = \frac{9}{5} ^\circ\text{C} + 32 \approx ^\circ\text{R}' - 459.58$.

2. THE STANDARD THERMODYNAMIC SCALE

E. F. MUELLER

The thermodynamic scale, which is based solely on the laws of thermodynamics and is independent of the properties of any material substance, is accepted as the standard scale of temperature. Temperatures on the thermodynamic scale are proportional to the pressures (or to the volumes) of an ideal gas in a perfect constant volume (or constant pressure) gas thermometer. The standard scale is realized in practice by use of gas thermometers, the indications of which can be reduced to the standard scale, or for higher temperatures, by use of the relations between the intensity of radiation from a black body and its temperature.

The experimental difficulties in the use of gas thermometers and the relatively low precision attainable in a single measurement have led to the introduction of a standard practical or working scale. This working scale is defined by certain base points, the temperatures of which have been determined by gas thermometer measurements, and by the indications of suitable instruments used for interpolation between the base points or for extrapolation to higher temperatures. It is possible in this way, without actually using a gas thermometer, to establish a working scale which does not differ to a demonstrable extent from the standard scale at any temperature within the range of the working scale. The practice of the various national standardizing laboratories in defining the working scale is substantially uniform at present, and it requires only minor adjustments and formal agreement to give the working scales of these laboratories the status of an international temperature scale. Such a scale would bear essentially the same relation to the standard scale, as do the international electric units to the absolute units.

The standard working scale may be defined by assigning numerical values to the temperatures defined by the boiling point of oxygen, the melting point of ice, the boiling point of water, the boiling point of sulfur, and the freezing points of antimony, silver and gold. The platinum resistance thermometer is the standard for interpolation in the range -195° to 0°C and from 0° to 650°C ; the platinum-platinum rhodium thermocouple for the range from 650° to 1063° ; and the luminous filament pyrometer above 1063°C .

Wien's law is accepted as expressing the brightness-temperature relation for a black body. For the purpose of defining the temperature scale above 1063°C the present practice of the national laboratories tends to favor the use of the value 1.430 cm degrees for the constant C_2 in this equation but the value 1.433 cm degrees has been adopted for I. C. T.

LITERATURE

(For a key to the periodicals, see end of volume)

- (¹) Reichenstadt, *8*, 48: 1034; 15. (²) Griffiths and Schofield, *83*, 12: 222; 18. (³) Wadner, Mueller and Foote, *Pyrometry*, p. 46 (pub. by Am. Soc. Min. and Met. Engrs., 1920). (⁴) Day and Sosman, *Dictionary of Applied Physics*, 1: 836; 22. (⁵) Honning, *245*, 44: 349; 24. (⁶) Reichenstadt, *245*, 44: 517; 24.

Reduction of Gas Thermometer Indications to the Thermodynamic Scale

The temperature t_p on the scale of a constant volume or constant pressure gas thermometer filled with any real gas, is proportional to the pressure the gas would exert or the volume it would occupy, respectively, if all of the gas were at the uniform temperature to be measured, and if the volume or the pressure, respectively, were the same at all temperatures. At 0° and 100°C, the temperature t_p is by definition identical with the thermodynamic temperature t , while at other temperatures t_p departs from t by amounts which are proportional to the pressure at 0°, called the initial pressure. The tabular values are accordingly given only for an initial pressure equivalent to 1 m of mercury.

The values of $t - t_p$ obtained by various methods cover a wide range, so that only the order of magnitude of the values can be considered as known with any certainty. The tendency in modern work in gas thermometry has been to employ hydrogen or helium as the thermometric gas, and for these gases the magnitude of $-t_p$ is comparable with the experimental error of the gas thermometer itself, so that the importance of an exact knowledge of the departure of the scales of these gas thermometers from the thermodynamic scale is correspondingly reduced.

REDUCTION OF GAS THERMOMETER INDICATIONS, t_p , TO THE THERMODYNAMIC CENTIGRADE SCALE, t

Values of $t - t_p$ for an initial pressure of 1 meter of mercury

t °C	Helium		Hydrogen		Nitrogen	
	Const. vol.	Const. press.	Const. vol.	Const. press.	Const. vol.	Const. press.
-250	+0.04	..	+0.12	..	+0.5	..
-200	+.02	+0.04	+0.06	+0.3	+0.5	..
-150	+.01	+.02	+.03	+.1	+2	+1.3
-100	+.005	+.005	+.015	+.04	+.06	+.4
-50	+.002	+.002	+.005	+.02	+.03	+.12
0	.000	.000	.000	.000	.00	.00
25	-.001	-.001	-.001	-.003	-.008	-.02
50	-.001	-.000	-.002	-.004	-.010	-.03
75	-.001	.000	-.001	-.003	-.005	-.02
100	.000	.000	.000	.000	.000	.00
150	+.002	+.001	+.01	+.01	+.01	+.05
200	+.006	+.001	+.02	+.02	+.02	+.12
250	+.01	+.002	..	+.03	+.04	+.2
300	+.02	+.003	..	+.04	+.07	+.3
350	+.03	+.005	..	..	+.10	+.4
400	+.04	+.006	..	..	+.14	+.5
450	+.05	+.008	..	..	+.17	+.6
500	..	..	..	..	+.2	+.7
600	..	..	..	..	+.3	+.9
800	..	..	..	..	+.5	+.13
1000	..	..	..	..	+.7	+.18
1200	..	..	..	..	+.10	+.23

LITERATURE

(For a key to the periodicals see end of volume)

- ¹⁾Rose-Innes, *3*, 2: 131; 01. ¹⁵⁾301, 08. ⁽²⁾Callendar, *3*, 5: 48; 03. ⁽³⁾Berthelot, *258*, 13B: 113p; 07. ⁽⁴⁾Buckingham, *51A*, 2: 237; 07. ⁽⁵⁾Cath and Onnes, *168*, No. 186a; 22. ¹⁸⁾6: 1, 22. ⁽⁶⁾Holborn and Otto, *96*, 23: 77; 24. ³⁰⁾320, 24. ⁽⁷⁾Keesom and Onnes, *B60*, 15; 24.

3. FIXED POINTS

E. F. MUELLER

t = Temperature on standard scale.

p = Pressure in millimeters of Hg (1 mm Hg = $\frac{1}{760}$ Atm) where p is between 680 and 780 mm.

BASE POINTS USED IN DEFINING THE STANDARD WORKING SCALE (I. C. T. temperature scale)

Substance	Phenomenon	Temperature, °C
Liquid O ₂	Vapor pressure	$t = \begin{cases} -183.00 + 0.245(t + 273.1) \log_{10} p/760 \text{ or} \\ -183.00 + 0.0126(p - 760) \\ -0.000065(p - 760)^2 \end{cases}$
Solid CO ₂ *	Vapor pressure	$t = \begin{cases} -78.51 + 0.1443(t + 273.1) \log_{10} p/760 \text{ or} \\ -78.51 + 0.01593(p - 760) \\ -0.000011(p - 760)^2 \end{cases}$
Mercury*	Freezing	$t = -38.87^\circ$
Ice	Melting	$t = 0.000^\circ$
Steam	Condensing	$t = \begin{cases} 100.000 + 0.1727(t + 273.1) \log_{10} p/760 \text{ or} \\ 100.000 + 0.0367(p - 760) - 0.000023(p - 760)^2 \end{cases}$
Sulfur	Condensing	$t = \begin{cases} 444.00 + 0.2215(t + 273.1) \log_{10} p/760 \text{ or} \\ 444.00 + 0.0069(p - 760) \\ -0.000048(p - 760)^2 \end{cases}$
Antimony	Freezing	To be determined with resistance thermometer $t = \text{approx. } 630.5^\circ$
Silver	Freezing	$t = 960.5^\circ$ (reducing atmosphere).
Gold	Freezing	$t = 1063^\circ$

* Not needed according to one suggested definition of the scale.

SECONDARY FIXED POINTS USEFUL IN CALIBRATING TEMPERATURE MEASURING INSTRUMENTS

(I. C. T. temperature scale)

Substance	Phenomenon	Temperature °C
Hydrogen	Boiling	$t = -252.78 + 0.0044(p - 760)$
Nitrogen	Vapor pressure	$t = -195.80 + 0.0109(p - 760)$
Naphthalene	Condensing	$t = 217.96 + 0.2078(t + 273.1) \log_{10}(p/760)$
Tin	Freezing	$t = 231.83$
Benzophenone	Condensing	$t = 305.9 + 0.194(t + 273.1) \log_{10}(p/760)$
Cadmium	Freezing	$t = 320.9$
Lead	Freezing	$t = 327.4$
Zinc	Freezing	$t = 419.48$
Aluminum (99.85 %)	Freezing	$t = 658.0$
Copper	Freezing	$t = 1083$ (reducing atmosphere)
Palladium	Freezing	$t = 1555 \pm 2$
Platinum	Melting	$t = 1755 \pm 6$
Tungsten	Melting	$t = 3370 \pm 30$

The above values are in accord with the temperature scale used throughout I. C. T. For the last three points the following slightly different values have been suggested for future adoption as secondary points on an international practical scale.

Palladium	Freezing	$t = \begin{cases} 1555 \text{ for } C_1 = 1.430 \\ 1554 \text{ for } C_1 = 1.433 \end{cases}$
Platinum	Melting	$t = \begin{cases} 1765 \text{ for } C_1 = 1.430 \\ 1763 \text{ for } C_1 = 1.433 \end{cases}$
Tungsten	Melting	$t = \begin{cases} 3400 \text{ for } C_1 = 1.430 \\ 3386 \text{ for } C_1 = 1.433 \end{cases}$

ADDITIONAL USEFUL SECONDARY POINTS

Substance	Formula	Phenomenon	Temperature, °C
Isopentane	C_5H_{12}	Freezing	-159.6
Methylcyclohexane	C_7H_{14}	Freezing	-126.3
Ether	$(C_2H_5)_2O$	Slow freezing (unstable)	-123.3
Ether	$(C_2H_5)_2O$	Rapid freezing or slow melting	-116.3
Carbon disulfide	CS_2	Freezing	-111.6
Toluene	$C_6H_5CH_3$	Freezing	-95.1
Ethyl acetate	$CH_3CO_2C_2H_5$	Freezing	-83.6
Chloroform	$CHCl_3$	Freezing	-63.5
Chlorobenzene	C_6H_5Cl	Freezing	-45.2
Carbon tetrachloride	CCl_4	Freezing	-22.9
Sodium sulfate	$Na_2SO_4 \cdot 10H_2O$	Transition	32.384
Potassium dichromate	$K_2Cr_2O_7$	Melting	397.5
30.5 NaCl + 69.5 Na_2SO_4		Melting	637.0
Potassium chloride	KCl	Melting	770.3
Sodium chloride	$NaCl$	Melting	800.4
Sodium sulfate	Na_2SO_4	Melting	884.7
Potassium sulfate	K_2SO_4	Inversion	583.0
Potassium sulfate	K_2SO_4	Melting	1069.1
Nickel	Ni	Melting or freezing	1452
Cobalt	Co	Melting or freezing	1490
Lithium metasilicate	Li_2SiO_3	Melting	1202
Dropide	$CuMgSi_2O_6$	Melting	1395
Anorthite	$CaAl_2Si_2O_8$	Melting	1555

LITERATURE

(For a key to the periodicals see end of volume)

- (1) Holborn and Day, **8**, 2: 505, 00. 12, 10: 171, 00 (Sb, Ag, Au, Cu). (2) Buckingham, **31A**, 3: 281, 07 (Review of values for S boiling point). (3) Waidner and Burgess, **31A**, 7: 1, 11 (Naphthalene, benzophenone, Sn, Cd, Zn). (4) Holborn and Henning, **8**, 38: 761, 11 (Naphthalene, benzophenone, S, Sn, Cd, Zn). (5) Day and Soeman, **152**, No. 187; 11 (Zn, Sb, Ag, Au, Cu, Pd, Pt). (6) Day and Soeman, **152**, 38: 517, 12. **8**, 38: 849, 12 (Benzophenone, Zn, Sb, S). (7) Henning, **8**, 43: 282, 14 (O, CO₂, Hg). (8) Emmoropoulos, **5**, 90A: 189; 14 (8). (9) Wilhelm, **31A**, 13: 655, 16 (Hg). (10) Chappuis, **258**, 16: 17 (8). (11) Bureau of Standards, Cir. No. 66; 17 (Sn, Zn, Al, Cu). (12) Cath, **168**, No. 152d; 18. **64V**, 21: 656, 19 (O, N). (13) Martineau and Onnes, **168**, No. 156b; 22. **18**, 6: 31, 22 (H). (14) Worthing, **90**, 23: 0, 24 (W). (15) Henning and Heuse, **8**, 23: 101, 24 (O, N, H). (16) Pinck and Wilhelm, **1**, 47: 25 (Naphthalene, benzophenone). See also References under Standard Scale of Temperature.
- Additional Fixed Points.** Timmermans, Van der Horst and Onnes, **168**, No. 157; 22 (Organic liquids below 0°). Dickinson and Mueller, **31A**, 3: 641; 07 (Na₂SO₄ transition). Roberts, **2**, 38: 386, 21 (Salts). Day and Soeman, Dictionary of Applied Physics, 1: 836, 22 (Metals and silicates). Richards, *et al.*, **1**, 36: 185, 14 (Na₂CO₃ hydrates transitions). 40: 89, 18 (SrCl₂ and SrBr₂ transitions). 41: 2019, 19 (C₂H₆).

THE LEIDEN TEMPERATURE SCALE

In certain sections of International Critical Tables (where so indicated) the Leiden temperature scale will be employed. (Onnes and Hoist, **168**, No. 141a. **64V**, 23: 175; 14. Cath and Onnes, **168**, No. 152a. **64V**, 26: 137, 190; 17. Cath, **168**, No. 152d. **64V**, 27: 553; 18.) The relation between the Leiden and the I. C. T. scales is shown by the following table:

Point	I. C. T.	Leiden	Leiden - I. C. T.
H ₂ (B. P.)	-252.8°	-252.74°	+0.06°
O ₂ (B. P.)	-183.0°	-182.95°	+0.05°
ca. -40°			+0.04°

4. RESISTANCE THERMOMETERS

E. F. MUELLER

Standard methods of calibration have been developed only for platinum resistance thermometers. Data on the resistance-temperature relation for particular thermometers of other metals, such as gold and lead, are available, and formulae to represent the relation have been published, but standardized methods for the calibration of such thermometers have not been developed.

The standard working scale, in the interval 0° to 650°C, is defined by means of a resistance thermometer of pure platinum, for which the relation between resistance R and temperature t is given by the equation:

$$R = R_0(1 + at + bt^2). \quad (1)$$

This may be transformed into the Callendar equations:

$$(pt) = \left(\frac{R - R_0}{R_{100} - R_0} \right) 100; t - (pt) = \delta \left[\left(\frac{t}{100} - 1 \right) \frac{t}{100} \right]. \quad (2)$$

The three constants in these equations, namely R_0 , a , and b or R_0 , R_{100} and δ respectively, are determined by calibration at the ice point, the steam point, and the sulfur boiling point.

The purity of the platinum must be such that $R_{100}/R_0 > 1.390$ and $R_{444.5}/R_0 > 2.645$, the latter requirement being equivalent to $\delta < 1.50$.

The Callendar equations were devised to facilitate computations by the method of successive approximations. The platinum temperature, symbol (pt) , is proportional to the resistance above R_0 and the amount by which it differs from the true temperature is given by the correction term,

$$\delta \left(\frac{t}{100} - 1 \right) \frac{t}{100}.$$

Consequently, a value of t sufficiently exact for use in computing the value of the correction term is readily obtained, if not by the first, then certainly by a second or third approximation.

In the interval -195° to 0°C the standard reference scale is defined by means of the platinum resistance thermometer, using the equation

$$t - (pt) = \delta \left[\left(\frac{t}{100} - 1 \right) \frac{t}{100} \right] + \beta \left[\left(\frac{t}{100} - 1 \right) \frac{t^3}{100^3} \right]. \quad (3)$$

The constants R_0 , R_{100} and δ are determined just as for the range above 0° and the additional constant β is determined by a calibration at the boiling point of oxygen. A criterion for the purity of the platinum is that $R_{-183}/R_0 < 0.250$.

Thermometers which are not to be heated above ordinary temperatures may be calibrated at the freezing point of mercury, the CO₂ point and the oxygen point, using the interpolation formula:

$$R = R_0(1 + at + bt^2 + ct^3). \quad (4)$$

The constant c in the equation is approximately equal to 5×10^{-12} and when this value is assumed, calibration at the CO₂ point may be omitted.

Equations (3) and (4) will yield substantially equivalent results, but they are not algebraically interconvertible.

Equation (1) or equation (2) may be used for temperatures up to 1000° or even 1100°C and the temperatures so determined will not depart appreciably from the standard scale.

LITERATURE

(For a key to the periodicals see end of volume)

- (1) Callendar, **62**, 178: 160; 87. (2) Waidner and Burgess, **31A**, 6: 149; 09. (3) Holborn and Henning, **8**, 38: 761, 11. (4) Henning, **8**, 40: 635; 13 (Pt and Pb at low temperatures). (5) Henning, **8**, 43: 282; 14. (6) Cath, Onnes and Burgess, **168**, No. 152c; 17. **64V**, 30, 1163, 18 (Pt and Au at low temperatures). (7) Henning and Heuse, **96**, 23: 95; 24. (8) Van Dusen, **1**, 47: 320, 25.

5. TEMPERATURE SCALES DEFINED BY LIQUID-IN-GLASS THERMOMETERS

E. F. MUELLER

The readings of any particular thermometer, taken when all of the liquid in the thermometer is at a uniform temperature, may be reduced to those which would have been obtained if the thermometer had been perfect and used under ideal conditions, by applying corrections for non-uniformity of the capillary bore, corrections for the change of reading due to departure of the external and internal pressures from arbitrary constant values, a correction for the departure of the ice-point reading, taken immediately after the temperature measurement, from the 0° mark, and

a correction to allow for the value of the mean scale degree, in case the difference between the readings of the thermometer taken first at 100°C and then at 0°C, does not correspond to 100 scale degrees. The reading of a thermometer, when so corrected, may be defined as the temperature on the liquid-in-glass scale for the particular liquid and the particular kind of glass of which the thermometer is made.

The temperature scales of mercury thermometers made of French hard glass (verre dur), Jena 16^{III}, Jena 59^{III}, Jena 1565^{III} and Jena combustion tubing are defined as above. For Kew glass, the temperature scale is defined in a somewhat different way, in that the point of reference is the (single) ice point reading taken after the thermometer has been held for a sufficiently long period at ordinary temperature (about 10°C) instead of the (variable) ice point reading taken immediately after each temperature measurement. It is apparent that temperatures on the mercury-in-glass scale are not proportional to the relative increase of volume of mercury-in-glass.

Constants characteristic of the several glasses are the ice-point depression, the softening point, and the average coefficient of expansion of mercury-in-glass, between 0° and 100°C.

The ice point depression is the difference between the ice point reading of the thermometer taken after it has been kept a sufficiently long time (a few days or weeks) at 0° and the ice point reading taken immediately after the thermometer has been kept a sufficiently long time (a few minutes or hours) at 100°C. Good thermometric glasses are characterized by small ice point depression (less than 0.1°C) and rapid recovery. Some glasses have an ice point depression of nearly 1°C.

The softening point determines the upper limit of temperature at which thermometers made of the glass can be used.

The expansion coefficient is useful in calculating corrections for emergent stem.

Values of these characteristic constants are.

Glass	Ice point depression °C	Softening point °C	Coefficient of cubical exp. of mercury-in-glass 0° to 100°C
Verre dur	0.07-0.11	500	0.000158
"Kew" glass	0.20		
Jena 16 ^{III}	0.04-0.08	505	0.000158
Jena 59 ^{III}	0.03-0.04	510	0.000164
Jena 1565 ^{III}	0.01	660	0.000172
Jena combustion	0.03	560	

Thermometers containing alcohol, toluene or pentane are not adapted for observation at 100°C, and for such thermometers the mean scale degree is conveniently referred to the interval 0° to -78.5°, the sublimation temperature of carbon dioxide serving to fix the latter temperature.

The tabular values are the result of comparisons of mercury-in-glass thermometers with gas thermometers or platinum resistance thermometers which served to establish the standard scale of temperature. The data for Jena 16^{III} glass and Jena 59^{III} glass may be used for Corning normal and Corning borosilicate thermometer glasses respectively.

Data of this kind were of great importance during the latter part of the 19th and even during the early part of this century, when calibrated mercury-in-glass thermometers were used to distribute the standard scale of temperature. At present the data are useful principally for minor purposes, such as calculation of factors for determining emergent stem correction, calculation of setting factors for metastatic thermometers, such as the Beckmann thermometer, graduation of thermometers by mercury thread calibration in the absence of standards and thermally controlled baths, etc.

In the tables, t represents the temperature on the standard working scale (platinum resistance thermometer) except for verre dur, where t represents temperatures on the former International hydrogen scale, which in practice is not distinguishable from the standard reference scale, while t_{gl} represents corresponding temperatures on the several liquid-in-glass scales.

VALUES OF $t - t_{gl}$ FOR MERCURY-IN-GLASS THERMOMETERS

t = temperature on standard scale, t_{gl} = temperature on mercury-in-glass scale.

t °C	French hard (verre dur)	Kew glass	Jena 16 ^{III}	Jena 59 ^{III}	Jena 1565 ^{III}	Jena combustion
-39	+0.420					
-30	+2.90		+0.28	+0.13		
-20	+1.72		+0.16	+0.07		
-10	+0.73		+0.07	+0.03		
0	.000	0.00	.00	.00	0.00	0.00
+10	.052	.00	.06	.02	.03	
20	.085	.00	.09	.04	.05	
30	.102	.005	.11	.04	.06	
40	.107	.01	.12	.03	.06	
50	.103	.01	.12	.03	.05	
60	.090	.01	.10	.02	.04	
70	.072	.015	.08	.01	.03	
80	.050	.02	.06	.00	.02	
90	.026	.025	.03	.02	.01	
100	.000	.00	.00	.00	.00	0.00
120	.06		.03	.05	.06	
140	.07		.02	.16	.03	
160	.03		.02	.31	.13	
180	.04		.12	.52	.38	
200	.12		.20	.84	.90	-1.13
220		.05	.13	1.3	1.6	
240		.09	.10	1.8	2.2	
260		.14	.26	2.4	3.0	
280		.20	.34	3.1	4.0	
300		.27	.44	3.9	5.1	
320			.58	4.8	6.4	
340			.72	5.9	7.8	
360			.88	7.3	9.5	
380			1.06	8.9	11.4	
400			12.6	10.5	13.5	
420			14.9	12.4	15.9	
440			17.4	14.7	18.6	
460			20.2	17.2	21.5	
480			23.3	20.0	24.8	
500			26.9	23.1	28.4	
550				32	39	
600				44		
650				58		

VALUES OF $t - t_g$ FOR LIQUID-IN-GLASS THERMOMETERS

t	Pentane in 16 ^{III} glass	Toluene in verre dur	Alcohol in verre dur
-190	-23.4		
-180	-21.0		
-170	-18.6		
-160	-16.2		
-150	-13.9		
-140	-11.6		
-130	-9.4		
-120	-7.3		
-110	-5.3		

VALUES OF $t - t_2$ FOR LIQUID-IN-GLASS THERMOMETERS.—Continued

t	Pentane in 16 ^{mm} glass	Toluene in verre dur	Alcohol in verre dur
-100	- 3.4		
- 90	- 1.7		
- 80	- 0.2	0.0	
- 78.5	0.0	0.0	0.0
- 70	+ 1.0	+ .4	+0.3
- 60	+ 2.0	+ .8	+ .6
- 50	+ 2.6	+ 1.1	+ .7
- 40	+ 3.0	+ 1.2	+ .9
- 30	+ 2.9	+ 1.2	+ .9
- 20	+ 2.1	+ 1.0	+ .8
- 10	+ 1.5	+ 0.6	+ .5
0	0.0	0.0	.0
+ 10	2.0		
20	- 4.4		
30	- 7.6		-3.6
100		-24.4	

LITERATURE

(For a key to the periodicals see end of volume)

Guillaume, *Traité pratique de la thermométrie* Gauthier-Villars, Paris, 1889 (General). Chappuis, 238, 6: 1.88 (Verre dur -25° to 100°). Harker, 5, 78A: 225; 06 (Kew glass). Scheel, *Deut. Mech. Ztg.*, 1916: 170 and Holborn, Scheel and Henning, 868 (Jena glasses and organic liquids in glass).

Emergent Stem Correction for Liquid-in-glass Thermometers

If a liquid-in-glass thermometer standardized for total immersion is used with a portion of the liquid column at a temperature below that of the bulb, the reading will be too low for this reason, and an emergent stem correction should be applied to the observed reading.

The emergent stem correction is calculated by the formula,

$$\text{Correction} = K n(t - t_2)$$

in which

K = coefficient of cubical expansion of mercury-in-glass, per °C,

t = temperature of bulb, °C,

t_2 = average temperature °C of the mercury column n °C degrees in length.

The value of t is to be determined by means of an auxiliary thermometer or thermometers, preferably with a capillary thermometer. The sign as well as the magnitude of the correction is given by the formula.

For many purposes, in using mercury-in-glass thermometers K may be treated as a constant of the glass, using the values given above for the apparent coefficient of expansion of mercury-in-glass. The value of K does, however, change with temperature. For purposes of computing the emergent stem correction, it may be considered as depending on the average of t and t_2 , that is $\frac{t + t_2}{2}$ and is here so tabulated.

If the coefficients of expansion of mercury and of glass were both constant, K would also be constant. Most of the change in K is the result of the varying coefficient of the mercury, so that the change in K with temperature for one glass may with some certainty be inferred from the change for some other glass.

The use of the formula requires that t , the temperature of the bulb, be known. In case t is not known, but is to be determined from the indication of the thermometer, the reading of the thermometer may be substituted in the formula in place of t , as a first approximation and the true magnitude of the correction then calculated by means of a second, or if necessary, a third approximation.

In many cases, in calculating the emergent stem correction for thermometers containing organic liquids, it is sufficient to use the approximate value, $K = 0.001$. The tables show to what extent this is justified for pentane, toluene, and alcohol. In such thermometers, K is practically independent of the kind of glass used.

With the abandonment of the mercury-in-glass thermometer as an instrument of high precision there has been an increasing tendency to use partial immersion thermometers, graduated and standardized for a particular depth of immersion, thus avoiding the necessity of determining and applying the correction for emergent stem.

TABLE OF EMERGENT STEM CORRECTION FACTORS
Mercury-in-glass Thermometers

$t + t_2$ 2 °C	Verre dur	Jena 16 ^{mm}	Jena 59 ^{mm}	Jena 156 ^{mm}	Jena combustion
50	0.000158	0.000158	0.000164	0.000172	0.000164
100	158	158	164	172	164
150	158	158	165	173	165
200	159	159	167	175	167
250		161	170	177	171
300		164	171	180	174
350			177	184	178
400			182	188	182
450			187	194	188
500			195	200	195

Liquid-in-glass Thermometers

$t + t_2$ 2	Pentane	Toluene	Alcohol
-180	0.0009		
-160	09		
-140	09		
-120	10		
-100	10		
- 80	10	0.0009	0.0010
- 60	11	09	10
- 40	12	10	10
- 20	13	10	10
0	14	10	10
+ 20	15	11	10

LITERATURE

(For a key to the periodicals see end of volume)

Buckingham, 31a, 8: 239, 12

Example: A thermometer of Jena 59^{mm} (or Corning borosilicate glass) indicated a temperature, t , of 470° after application of corrections peculiar to the instrument. The thermometer was immersed to the 150° mark, and the average temperature t_2 of the 320° (n) of exposed mercury column was found to be 190°. The average of t and t_2 is 330° and the value of the factor K for this temperature is 0.000176. Accordingly

$$\text{Correction} = 0.000176(320)(470 - 190) = 15.8^\circ$$

The corrected temperature is therefore 470° + 15.8° = 485.8°. Since the bulb temperature was considerably higher than 470° a second approximation may be tried:

$$\text{Correction} = 0.000176(320)(486 - 190) = 16.7^\circ$$

The second approximation yields a corrected temperature of 470° + 16.7° = 486.7° which in view of the rather large emergent stem correction, may properly be reported as 487°.

Possible short cuts in making the second approximation will be readily apparent.

The example given is purposely somewhat exaggerated by assuming an unusually high temperature (100°) for the emergent

stem, in order to show that the factor K may differ appreciably from the conventional value of 0.00016.

For computations in Fahrenheit temperatures, the proper value of K is $\frac{9}{5}$ of the tabulated value.

6. THERMOCOUPLES

L. H. ADAMS

"Standard" Calibration Tables (for Use with Deviation Curve)

Standard tables such as these do not necessarily have any absolute significance; primarily, they are arbitrary reference curves which, although representing fairly well the temperature-emf functions for certain thermocouples, are intended for use with an appropriate deviation-curve. This correction-curve is determined for each couple by calibration at several—preferably

three or more—fixed points within the "applicability range of the couple." This curve is constructed by plotting ΔE as ordinate ($\Delta E = E_{obs.} - E_{stand.}$) against $E_{stand.}$ as abscissa. In order to obtain the temperature corresponding to the emf indicated by the couple, the appropriate value of ΔE (as obtained from its deviation curve) is subtracted algebraically from the observed value of E before the latter is converted into degrees by means of the table. Example: At a certain temperature a copper-constantan couple gave an emf of 8720 microvolts. From the previously determined deviation curve of the particular couple the value of ΔE at 8720 microvolts is found to be 12 microvolts. The "standard" emf is therefore 8720 - 12 or 8708 microvolts and from the copper-constantan table this may be seen to correspond to 189.08°, which is the required temperature.

The fixed (i.e., cold) junction is supposed to be maintained at 0°C.

TEMPERATURES AND TEMPERATURE DIFFERENCES FOR EVERY 100 MICROVOLTS
Platinum: Platinrhodium (90-10). Standard range, 630°-1083°C. Applicability range, 0°-1784°C

E μV	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	E μV
0	0	147.1	265.4	374.3	478.1	578.3	675.3	769.5	861.1	950.4	0
100	17.8	159.7	270.6	384.9	488.3	588.1	684.8	778.8	870.1	959.2	100
200	34.5	172.1	287.7	395.1	498.4	597.9	694.3	788.0	879.1	968.0	200
300	50.3	184.3	298.7	405.9	508.5	607.7	703.8	797.2	888.1	976.1	300
400	65.4	196.3	309.7	416.3	518.6	617.4	713.3	806.4	897.1	985.4	400
500	80.0	208.1	320.6	426.7	528.6	627.1	722.7	815.6	906.1	994.1	500
600	94.1	219.7	331.5	437.1	538.6	636.8	732.1	824.7	915.0	1002.8	600
700	107.8	231.2	342.3	447.4	548.6	646.5	741.5	833.8	923.9	1011.5	700
800	121.2	242.7	353.0	457.7	558.5	656.1	750.9	842.9	932.8	1020.1	800
900	134.3	254.1	363.7	467.9	568.4	665.7	760.2	852.0	941.6	1028.7	900
1000	147.1	265.4	374.3	478.1	578.3	675.3	769.5	861.1	950.4	1037.3	1000

E μV	10,000	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000	E μV
0	1037.3	1122.2	1205.9	1289.3	1372.4	1454.8	1537.5	1620.9	1704.3	0
100	1045.9	1130.6	1214.2	1297.7	1380.7	1463.0	1545.8	1629.2	1712.6	100
200	1054.4	1139.0	1222.6	1306.0	1389.0	1471.2	1554.1	1637.6	1721.0	200
300	1062.9	1147.4	1230.9	1314.3	1397.3	1479.4	1562.4	1645.9	1729.3	300
400	1071.4	1155.8	1239.3	1322.6	1405.6	1487.7	1570.8	1654.3	1737.7	400
500	1079.9	1164.2	1247.6	1330.9	1413.8	1496.0	1579.1	1662.6	1746.0	500
600	1088.4	1172.5	1255.9	1339.2	1422.0	1504.3	1587.5	1670.9	1754.3	600
700	1096.9	1180.9	1264.3	1347.5	1430.2	1512.6	1595.8	1679.3	1762.6	700
800	1105.4	1189.2	1272.6	1355.8	1438.4	1520.9	1604.2	1687.6	1770.9	800
900	1113.8	1197.6	1281.0	1364.1	1446.6	1529.2	1612.5	1696.0	1779.3	900
1000	1122.2	1205.9	1289.3	1372.4	1454.8	1537.5	1620.9	1704.3	1787.6	1000

TEMPERATURES AND TEMPERATURE DIFFERENCES FOR EVERY 100 MICROVOLTS
Copper: Constantan

Σ μV	-5000	-4000	-3000	-2000	-1000	-0	0	1000	2000	3000	4000	5000	6000
0	-169 14 5 29	-124 46 4 01	-87 86 3 48	-55 81 3 05	-26 82 2 79	0 2 69	0 2 59	25 27 2 45	49 20 2 55	72 08 2 23	94 07 2 16	115 31 2 09	135 91 2 03
100	-174 34 5 40	-128 47 4 09	-91 28 3 45	-58 86 3 08	-29 61 2 81	-2 60 2 98	2 59 2 57	27 72 2 45	51 53 2 52	74 31 2 25	96 23 2 15	117 40 2 08	137 94 2 03
200	-179 74 6 04	-132 56 4 19	-94 74 3 51	-61 94 3 11	-32 42 2 84	-5 22 2 88	5 16 2 86	30 15 2 42	53 85 2 51	76 54 2 28	98 38 2 14	119 48 2 08	139 96 2 03
300	-185 38 6 09	-138 74 4 28	-98 25 3 57	-65 05 3 16	-35 26 2 86	-7 85 2 85	7 72 2 85	32 37 2 42	56 16 2 50	78 76 2 21	100 32 2 14	121 56 2 07	141 98 2 01
400	-191 27 6 17	-141 02 4 35	-101 82 3 63	-68 20 3 19	-38 12 2 85	-10 50 2 87	10 27 2 85	34 98 2 40	58 46 2 50	80 97 2 20	102 66 2 13	123 63 2 06	143 99 2 01
500	-197 44 6 61	-145 41 4 30	-105 45 3 88	-71 39 3 22	-41 01 2 80	-13 17 2 82	12 80 2 82	37 38 2 39	60 76 2 48	83 17 2 28	104 79 2 18	125 89 2 06	146 00 2 00
600	-203 95 6 97	-149 91 4 61	-109 13 3 74	-74 61 3 29	-43 91 2 93	-15 86 2 71	15 32 2 81	39 77 2 38	63 04 2 27	85 37 2 19	106 91 2 11	127 75 2 05	148 00 2 00
700	-210 92 7 65	-154 32 4 73	-112 87 3 30	-77 57 3 29	-46 84 2 96	-18 37 2 73	17 83 2 49	42 15 2 36	65 31 2 27	87 36 2 18	109 02 2 10	129 80 2 04	150 00 1 99
800	-218 47 7 66	-159 25 4 87	-116 67 3 56	-81 16 3 53	-49 80 2 99	-21 30 2 75	20 32 2 48	44 31 2 35	67 58 2 25	89 74 2 17	111 12 2 10	131 84 2 04	151 99 1 99
900	-224 12 8 08	-164 12 5 08	-120 53 3 58	-84 49 3 37	-52 79 3 02	-24 05 2 77	22 80 2 47	46 56 2 34	69 83 2 25	91 91 2 16	113 22 2 09	133 88 2 03	153 97 1 98
1000	-228 14 8 08	-168 14	-124 46	-87 86	-55 81	-26 82	25 27	49 20	72 08	94 07	115 31	135 91	155 95

Σ μV	7000	8000	9000	10,000	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000	19,000
0	155 95 1 97	175 50 1 95	194 62 1 59	213 36 1 85	231 74 1 82	249 82 1 79	267 60 1 78	285 13 1 74	302 42 1 72	319 49 1 70	336 36 1 68	353 08 1 66	369 61 1 64
100	157 92 1 97	177 43 1 93	196 51 1 59	215 21 1 86	233 56 1 82	251 61 1 79	269 36 1 76	286 87 1 74	304 14 1 71	321 19 1 69	338 04 1 68	354 74 1 66	371 25 1 64
200	159 89 1 97	179 36 1 92	198 40 1 58	217 06 1 85	235 38 1 82	253 40 1 78	271 12 1 76	288 61 1 74	305 85 1 71	322 88 1 69	339 72 1 68	356 40 1 66	372 89 1 64
300	161 66 1 96	181 28 1 92	200 28 1 58	218 91 1 84	237 20 1 81	255 18 1 78	272 88 1 76	290 35 1 73	307 56 1 71	324 57 1 69	341 40 1 67	358 06 1 66	374 53 1 64
400	163 82 1 96	183 20 1 91	202 16 1 58	220 75 1 84	239 01 1 81	256 96 1 78	274 64 1 76	292 08 1 73	309 27 1 71	326 26 1 69	343 07 1 67	359 72 1 66	376 17 1 65
500	165 78 1 96	185 11 1 91	204 04 1 57	222 59 1 84	240 82 1 81	258 74 1 78	276 40 1 76	293 81 1 73	310 98 1 71	327 95 1 69	344 74 1 67	361 37 1 65	377 80 1 63
600	167 73 1 96	187 02 1 91	205 91 1 57	224 43 1 83	242 63 1 80	260 52 1 77	278 15 1 75	295 54 1 72	312 69 1 70	329 64 1 68	346 41 1 67	363 02 1 65	379 43 1 63
700	169 68 1 94	188 93 1 90	207 78 1 56	226 26 1 83	244 43 1 80	262 29 1 77	279 90 1 75	297 26 1 72	314 39 1 70	331 32 1 68	348 08 1 67	364 67 1 65	381 06 1 63
800	171 62 1 94	190 83 1 90	209 64 1 56	228 09 1 83	246 23 1 80	264 06 1 77	281 65 1 74	298 98 1 72	316 09 1 70	333 00 1 68	349 75 1 67	366 32 1 65	382 69 1 63
900	173 56 1 94	192 73 1 89	211 50 1 56	229 92 1 83	248 03 1 79	265 83 1 77	283 39 1 74	300 70 1 72	317 79 1 70	334 68 1 68	351 42 1 66	367 97 1 64	384 32 1 63
1000	175 50	194 62	213 36	231 74	249 82	267 60	285 13	302 42	319 49	336 36	353 08	369 61	385 95

TEMPERATURES AND TEMPERATURE DIFFERENCES FOR EVERY 0.5 MILLIVOLT

Chromel-alumel					
E mv	0	10	20	30	40
0	0.0	244.5	482.8	719.2	970.4
	12.3	12.2	11.7	12.2	13.0
0.5	12.3	256.7	494.5	731.4	983.4
	12.1	12.2	11.7	12.3	13.1
1.0	24.4	268.9	506.2	743.7	996.5
	12.0	12.1	11.7	12.3	13.2
1.5	36.4	281.0	517.9	756.0	1009.7
	12.0	12.1	11.7	12.3	13.3
2.0	48.4	293.1	529.6	768.3	1023.0
	12.0	12.0	11.7	12.4	13.3
2.5	60.4	305.1	541.3	780.7	1036.3
	12.0	12.0	11.7	12.4	13.4
3.0	72.4	317.1	553.0	793.1	1049.7
	12.0	12.0	11.7	12.5	13.5
3.5	84.4	329.1	564.7	805.6	1063.2
	12.0	11.9	11.7	12.5	13.6
4.0	96.4	341.0	576.4	818.1	1076.8
	12.1	11.9	11.8	12.5	13.7
4.5	108.5	352.9	588.2	830.6	1090.5
	12.1	11.9	11.8	12.6	13.7
5.0	120.6	364.9	600.0	843.2	1104.2
	12.2	11.9	11.8	12.6	13.8
5.5	132.8	376.8	611.8	855.8	1118.0
	12.4	11.9	11.8	12.6	13.8
6.0	145.2	388.6	623.6	868.4	1131.8
	12.5	11.8	11.8	12.6	13.9
6.5	157.7	400.4	635.4	881.0	1145.7
	12.6	11.8	11.8	12.7	13.9
7.0	170.2	412.2	647.2	893.7	1159.6
	12.6	11.8	11.9	12.7	14
7.5	182.7	424.0	659.1	906.4	(1174)
	12.6	11.8	11.9	12.7	14
8.0	195.2	435.8	671.0	919.1	(1188)
	12.4	11.8	12.0	12.8	14
8.5	207.7	447.6	683.0	931.9	(1202)
	12.3	11.8	12.0	12.8	
9.0	220.0	459.4	695.0	944.7	
	12.3	11.7	12.1	12.8	
9.5	232.3	471.1	707.1	957.5	
	12.2	11.7	12.1	12.9	
10.0	244.5	482.8	719.2	970.4	

Fixed-junction Corrections

If the fixed or "cold" junction be not maintained at 0°C, a correction must be applied. This may be done by any one of several methods, of which the following are suggested.

A. Let the temperature of the fixed junction be t_c and that of the variable or "hot" junction be t . Then to the emf as read E_{t-t_c} , add the emf corresponding to t_c . This gives E_t which may at once be converted into degrees by means of the proper table.

B. Multiply the fixed-junction temperature by the factor, $f = (dE/dt)_0 / (dE/dt)$, which is the ratio of the mean emf-temperature gradient between 0° and t_c to the gradient at t , and add the product to t' , the uncorrected temperature. That is, $t = t' + ft_c$. These emf-temperature gradients may be obtained by taking the reciprocals of the numbers appearing in the difference columns of the calibration tables.

COMPARISON OF THE MORE COMMON THERMOCOUPLES

E mv	Temperature, °C				E mv	Temperature, °C			
	Iron: constantan	Chromel (X): copel	Chromel (P): alumel	Platinrhodium: gold-palladium		Platinum: platinrhodium (Hercules)	Platinum: Platinrhodium (Johnston-Matthey)	Copper: constantan	
0	0	0	0	0	0	0	0	0	0
5	95	105	121	131	1	147	146	25	
10	186	195	244	237	2	265	260	49	
15	277	277	365	335	3	374	364	72	
20	367	353	483	429	4	478	461	94	
25	457	425	600	513	5	578	553	115	
30	546	495	719	607	6	675	641	136	
35	632		813	694	7	769	725	156	
40	713		970	779	8	861	806	176	
45	792		1104	866	9	950	884	195	
50	871			954	10	1037	959	213	
55	950			1044	11	1122	1032	232	
60				1136	12	1206	1103	250	
					13	1289	1173	268	
					14	1372	1242	285	
					15	1455	1311	302	
					16	1537	1379	320	
					17	1620	1447	336	
					18	1704	1515	353	

* 10% Rh, 40% Pd.

LITERATURE

(For a key to the periodicals see end of volume)

- (1) Adams, 128, 2: 469; 13, 1, 26: 65; 14, 255, 1919: 2111. (2) Adams, O. (3) Adams and Johnston, 12, 22: 534; 12. (4) Foote, Fairchild and Harrison, 52, No 170, 21. (5) Hoskins Mfg Co., Catalog D: 24. (6) Roberts, O. (7) Soeman, 12, 20: 7, 10.

OPTICAL PYROMETRY

C. O. FAIRCHILD AND H. T. WENDEL

The temperature scale above the melting point of gold is based upon Wien's Law, $J_\lambda = C_1 \lambda^{-5} e^{-C_2/\lambda T}$, in which the constant C_1 (1.433

cm deg) and the value 1336°K for the melting point of gold determine the scale. In optical pyrometry temperatures are usually measured by comparing the brightness of a glowing object with that of the filament of a lamp mounted in the image plane of a simple telescope. For highest accuracy the current through the lamp is kept at or near the value corresponding to 1336°K and higher temperatures are measured by reducing the brightness of the image of the object to match that of the filament by means of a suitable screen such as a rotating sector or an absorption glass of known transmission. The temperature is then found from the following formula derived from Wien's Law:

$$\frac{1}{T} = \frac{1}{1336} + \lambda_0 \cdot \frac{\log_{10} R}{6222}$$

in which R is the transmission of the absorption device and λ_0 is the "mean effective wave-length" of a color filter in the pyrometer for the temperature interval 1336° to T . Values of λ_0 can be obtained in some cases by the use of Table 2.

For practical purposes the pyrometer is ordinarily calibrated in the range 700° to 1400°C (occasionally to 1550°C) in terms of filament current. A satisfactory empirical relation between the current I through the lamp filament and temperature t °C is:

$I = a + bt + ct^2 + dt^3$. For tungsten lamps with short 3 mil filaments dI/dt varies from about 0.00015 ampere per degree at 700°C ($I = 0.3$) to 0.0003 ampere per degree at 1400°C ($I = 0.5$). For measurements above 1400° an absorption glass of such type is employed that $A(= \lambda_0 \log_{10} R/6223)$ is a constant or varies slightly with temperature. If the spectral transmission, Tr , of the

absorption device is of the form $Tr_\lambda = e^{-\frac{K}{\lambda}}$, A will be a constant and equal to K/e_2 . For sector discs $A = \text{constant} \cdot \lambda e_2$.

TABLE 1

Temperatures extrapolated from 1336°K, using Wien's Law, compared with those obtained using Planck's Law. The values in this table were computed from the relation:

$$T_p = \frac{C_2}{\lambda \log_{10} \left[1 + \frac{e_2}{e_1} T_w \right]}$$

taking $\lambda = 0.65\mu$.

T_w	T_p	$T_w - T_p$	T_w	T_p	$T_w - T_p$
1336	1336	0.000	4500	4493	7
2000	1999	0.003	5000	4986	14
2500	2499	.012	6000	5959	41
3000	2999	.71	8000	7825	175
3500	3499	0	10 000	9550	450
4000	3997	3	∞	31 800	∞

TABLE 2

Effective wave-length and mean effective wave-length of optical pyrometer red glass filters. The effective wave-length λ_T is found from the formula

$$\frac{1}{\lambda_T} = a - b$$

Equation*	Corning H. T. red glasses				Visibility
	A	B	C	D	
a	1 5509	1 5415	1 5369	1 5319	
b	29.6	28.2	28.0	26.8	
Wave-length microns	Transmission				
0.615	0.000	0.000	0.000	0.000	0.442
.625	.085	.007	.000	.000	.323
.635	.520	.270	.141	.080	.220
.645	.730	.533	.389	.350	.141
.655	.798	.637	.508	.520	.084
.665	.815	.664	.541	.580	.046
.675	.823	.677	.557	.605	.024
.685	.828	.686	.567	.605	.0126
.695	.830	.689	.572	.603	.0061
.705	.830	.689	.572	.598	.0031
.715	.826	.682	.564	.590	.00158
.725	.824	.679	.559	.580	.00078
.735	.822	.676	.555	.572	.00038
.745	.820	.672	.551	.567	.00018
.755	.818	.669	.547	.550	.00009
.765	.815	.664	.541	.535	.00003
.775	.813	.661	.537	.510	.00000

* The constants a and b are given for four typical red glasses of the transmissions indicated. The change in effective wave-length with temperature of glass filter itself is closely 0.00000 μ per deg C at ordinary room temperatures.

Angular apertures required in the telescope of the disappearing filament type of optical pyrometer for a balance between reflection and diffraction at the filament. Under such conditions disappearance of the filament is obtained without resorting to low magnification or very low resolving power.

TABLE 3.—TUNGSTEN FILAMENT OF CIRCULAR CROSS-SECTION

Exit aperture radians	Entrance aperture, radians	
	Filament diameter 0.04 to 0.06 mm	Filament diameter 0.1 mm
0.005	very low resolving power	
.01	0.04 and larger	0.04 and larger
.02	.06 to .16	.055 to .07
.04	.08 to .13	
.06	non-disappearance	

TABLE 4.—BRIGHTNESS TEMPERATURE VERSUS TRUE TEMPERATURE FOR RED LIGHT($\gamma = 0.65\mu$)

Observed brightness temperature	True temperature						
	Platinum ⁽¹⁾	Iron ⁽²⁾	Iron oxide ⁽³⁾	Nickel oxide ⁽⁴⁾	Copper ⁽⁵⁾	Copper oxide ⁽⁵⁾	Nichrome or chromel ⁽⁶⁾
700	745		700	701			702
800	857		801	802			804
900	972		902	904		903	906
950					1083	958	
975					1181		
1000	1090		1004	1007	1156	1020	1010
1025					1193		
1050					1231	1087	
1100	1210	1183	1106	1110		1159	1116
1150						1233	
1200	1332	1296	1210	1215			1224
1300	1455	1410		1320			
1400		1525					
1500		1641					
1600		1758					
1700		1877					
1750		1936					

LITERATURE

(For a key to periodical see end of volume)

- (1) Waidner and Burgess, *Sta*, **3**: 163, 67. (2) Computed for an emissivity of 0.4, cf. Burgess, *Sta*, No. **91**: 17. (3) Burgess and Foote, *Sta*, **12**: 83; 15. (4) Burgess and Foote, *Sta*, **11**: 41; 15. (5) Burgess, *Sta*, **6**: 111; 99. (6) Foote, Bureau of Standards, *O*. For data on C, Ta, W and other substances see sections on emissivity, color temperature, etc.

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LABORATORY METHODS FOR PRODUCING AND MAINTAINING CONSTANT TEMPERATURE

C. W. KANOLT, OLAF A. HOUGEN, ROLAND A. RAGATZ AND W. E. FORSYTHE

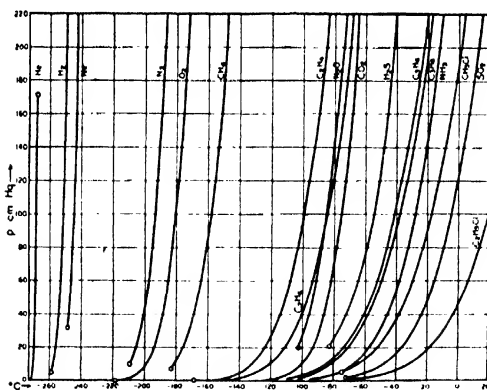
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The successful application of the methods described in this section involves careful attention to the details of construction and operation of the auxiliary apparatus. For these details the reader is referred to the original literature.

1. TEMPERATURES BELOW 0°C

C. W. KANOLT

(a) *Bath Liquids Boiling at Constant Pressure.*—The temperature-pressure data for a number of suitable liquids are displayed graphically in Fig. 1. For further data concerning these liquids consult the index of I. C. T. Solid CO₂ mixed with a suitable low-freezing liquid may also be used. Cf. Sec. (b) *infra*, also (42).



Bath liquids for the maintenance of constant temperatures by boiling at a constant pressure.

(b) *Bath Liquids with Thermostatic Control.*—In some cases the liquid-solid mixture with proper thermal insulation may be conveniently used to automatically maintain the temperature of the invariant point (M.P. or eutectic). For general discussion of low temperature baths v. (16). The systems given below are arranged approximately in ascending order of their minimum working temperatures.

Abbreviations and Signs.—B. = "boils;" Cor. = "corrosiveness" or "corrosive;" E. = "eutectic composition;" Fl. = "flammable," hazardous, especially if cooled by means of liquid air. S. = "solidifies" or "solidification;" SS. = "suggested for use at its solidifying temperature;" η = "viscosity;" + = "high," — = "moderate or low," thus, η — = "moderate or low viscosity."

Below -150° .—1. *Petroleum distillate*, d_4^{20} 0.647; S. < -190° (3). *Ibid.*, d_4^{20} = 0.651; S. < -190° . H. 33° . η + at -190° (22). 2. *Amylene*, techn.: S. < -188° . Fl. η > petrol ether, q.v. (18, 22). 3. *Propane*: S. at -187.8° . B. at -37° . Fl. 4. *Propylene*: S. at -185.2° . B. at -47° . Fl. May be used -190° to -160° . Moisture causes turbidity (25). 5. *Butane*, techn.: η — at -180° . Fl. Gas at ordinary temp. (24). 6. *Methyl chloride* 25% + *methyl ether* 75%, E.: S. at -154° . B. < -20° . Fl. (4). 7. *Isopentane*: S. at -159.6° . B. at 28.0° . Fl. SS. (37).

From -150° to -125° .—8. *Pentane*, techn.: S. < -190° for some samples. B. ca. 25° . Fl. (16). η varies with diff. samples. Cf. (5, 7, 16, 17, 22, 24, 31). 9. *Petroleum ether*: one sample S. at -160° (7). Other samples used down to -130° (16); -135° (5); -150° (18, 30); -160° (25). Fl. 9a. *Chloroform* 18% + *trans-dichloroethylene* 13% + *trichloroethylene* 20% + *ethyl bromide* 41% + *ethyl chloride* 8%: S. < -150° . Non-Fl. η_{-140} 0.71 poises, η_{-180} 6.3 poises (21). 10. *Chloroform* 15% + *methylene chloride* 25% + *trans-dichloroethylene* 11% + *trichloroethylene* 16% + *ethyl bromide* 33%: S. ca. -150° . Non-Fl. η_{-140} = 0.85 poises, η_{-180} = 15 poises (21). 11. *Ethyl chloride*: S. at -138.7° . B. 12.2° . Fl. η — at -138.7° (21). Cor. — (20, 19). Non-Fl. by adding methyl bromide (13). 12. *Chloroform* 20% + *trans-dichloroethylene* 14% + *trichloroethylene* 21% + *ethyl bromide* 45%. E.: S. at -139° . Non-Fl. η_{-180} = 0.29 poises; η_{-140} = 0.81 poises (21). 13. *Methyl ether*: S. at -138.5° . B. at -23.7° . Fl. 14. *n-Pentane*: S. at -130.8° . Fl. Very volatile. 15. *Ethyl ether* 75 vol. % + *toluene* 25 vol. %: S. ca. -130° (7). 16. *Methylcyclohexane*: S. at -126.3° . Fl. SS. (37). 17. *Petroleum distillate*, d_4^{20} 0.713; partly ca. -125° . S. ca. -147° (6).

From -125° to -100° .—18. *Chloroform* 23% + *ether* 77%, E.: S. at -121.7° (35). 19. *Ethyl bromide*: S. at -119° . Non-Fl. Becomes Cor. under action of light (10). η_{-110} = 0.053 poises (21). 20. *Ethyl ether*: S. at -116.3° and (metastable) at -123.3° . Fl. SS. (37). 21. *Carbon disulfide*: S. at -111.6° . Fl. toxic. SS. (37). 22. *Chloroform* 27% + *methylene chloride* 60% + *carbon tetrachloride* 13%. E.: S. at -111° . Non-Fl. η — at -111° (21).

From -100° to -90° .—23. *Chloroform* 31% + *trichloroethylene* 69%. E.: S. at -100° . Non-Fl. η — at -100° (21). 24. *Chloroform* 71% + *ether* 29%. E.: S. at -97.4° (25). 25. *Methylene chloride*: S. at -97° . Volatile but non-Fl. η — at -97° (21). Addition of alcohol recommended to avoid formation of HCl in light (28). 26. *Chloroform* 70% + *ether* 21%. E.: S. at -95° (35). 27. *Toluene*: S. at -95.1° . Fl. η + at -80° (24). SS. (37). 28. *Acetone*: S. at -94.6° . Fl. $\eta_{-80.7}$ = 0.0205 poise (1). 29. *Methyl chloride*: S. at -91.5° . B. at -24.1° . Fl. —, and non-Fl. by adding methyl bromide (14). Cor. —.

From -90° to -80° .—30. *Ethyl alcohol*: S. at -114.1° . Fl. η + near -114° (18, 39). η increased by presence of H₂O (24). Used down to -80° (15, 16) and to -90° (24). 31. *Trichloroethylene*: S. at -86.4° . Non-Fl. η — at -86° . Cor. —, when pure but + when ox. by air. 32. *Ethyl acetate*: S. at -83.6° . Fl. SS. (37). 33. *Carbon tetrachloride* 49% + *chloroform* 51%. E.: S. at -81° . Non-Fl. η — at -81° (21). 34. *trans-Dichloroethylene*: S. at -80.5° . Fl. (9), but less so than vol. hydrocarbons (21). Cor. —.

From -80° to -50° .—35. *Ethyl ether* 80% + *ethyl alcohol* 20%: Fl. Used down to -78° . η < alcohol. Less turbid from moisture than is ether (23). 36. H_2SO_4 , 38% in H_2O , E.: S. at -75° . η + at low temps. Cor. (23). 37. *Chloroform*: S. at -63.5° . Non-Fl. η - at -63° (21). Cor. - SS. (37). A small quantity of alcohol prevents decomposition. 38. $CaCl_2$ 29.8% in H_2O , E.: S. at -55° . η + at -55° (38). Cor. + (32, 41). Cor. diminished by addition of K_2CrO_4 (27).

From -50° to -25° .—39. *Gasolene* + CCl_4 : Depending upon the density of the gasolene the following %'s of CCl_4 should be used to reduce Fl. 0.765, 30%; 0.725, 45%; 0.700, 60%; 0.680, 70% (2, 28). The 65% CCl_4 may be used at -50° . Flash pt. ca. 50° . Cor. (9). 40. *Chlorobenzene*: S. at -45.2° . Fl. SS. (37). 41. $NaClNS$ 500 g per l H_2O , E.: S. at ca. -33° . Cor. < $NaCl$ or $CaCl_2$ (38). 42. *Ethyl alcohol* 25% + *glycerine* 25% + *water* 50%: Used to -30° (40).

From -25° to 0° .—43. *Carbon tetrachloride*: S. at -22.9° . Non-Fl. η - at -23° (21). Cor. - SS. (37). 44. $NaCl$ 22.4% in water, E.: S. at -21.2° . η - Cor.

DISTILLATES FROM GALICIAN PETROLEUM(11)

Fractionation temp	24° 40°	40° 60°	60° 80°	80°-100°	100°-120°
d_4^{15} ..	0.6324	0.6593	0.7005	0.7351	0.7495
S. at ..	-203°	-198°	-185°	-170°	-151°
Fractionation temp.	120° 110°	140°-160°	160°-180°	180°-200°	200°-220°
d_4^{15}	0.7625	0.7738	0.7872	0.7982	0.8072
S. at	-139°	-127°	-112°	-104°	-93°

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(For a key to the periodicals see end of volume)

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LABORATORY METHODS FOR THE PRODUCTION COLD

C. W. KANOLT

(a) Liquids for Cooling by Vaporization into the Atmosphere

The liquid may be sprayed onto the object to be cooled (2, 3), it may be vaporized by a current of air passed through it, forming a bath in which the object to be cooled is immersed (5); it may be vaporized from a porous vessel (1); or in other ways. The temperatures obtainable from the liquids are approximately in the order of their boiling points given below, but are much lower. Gases with critical temperatures above 20° are not included.

The data given below are, in the order given; boiling point, name of liquid, remarks, and literature.

Remarks: 1. Harmless. 2. Harmful. 3. Flammable. 4. Non-flammable. 5. Anaesthetic.

100°, *Water* (1, 4). 61.2° , *Chloroform* (4, 5). 46.2° , *Carbon disulphide* (2, 3). 40° , *Methylene chloride* (4, 5). 38.4° , *Ethyl bromide* (4, 5). 35° - 39° , *Amylene*, techn. (3, 5). 34.6° , *Ethyl ether* (3, 5) produces -15° to -20° (2, 5). 13.1° , *Ethyl chloride* (3, 5) produces -35° (2). 0° - 70° , *Volatile petroleum distillates* (1, 3). -10.0° , *Sulfur dioxide* (2, 4). -24.1° , *Methyl chloride* (3, 5) produces -55° to -60° (1, 2). -33.4° , *Ammonia* (2, 3). *Carbon dioxide* (1, 4). (The liquid can not exist at atmospheric pressure. Solid can be obtained by the release of liquid from pressure. Sublimation temperature -78.5° . Used mixed with a liquid (6), produces -112° to -115° (1). -89.8° , *Nitrous oxide* (1, 5).

LITERATURE

(For a key to the periodicals see end of volume)

- (1) d'Arsonval, 34, 133: 980; 01. (2) Braun, Die Lokalanästhesie, Chapt. 4. (3) Kanolt, 48, 9: 416; 21. (4) Krause, 191, 6: 635; 19. (5) Lawrence, 247, No. 18: 10; 16. (6) Thiele and Schulte, 7, 96: 312; 20.

(b) Freezing Mixtures

To absorb the largest amount of heat, an aqueous freezing mixture should be made with ice, rather than with water, and the other substance used should be cooled to 0° , or as low as possible, before mixing with the ice. To absorb at a given temperature the maximum amount of heat per unit mass of mixture, the proportions of ice and the other cooling agent should be those of a solution, the freezing point of which is the required temperature (8). The eutectic (cryohydric) temperature is the lowest attainable, if the ingredients are precooled sufficiently. Most, if not all, salts when mixed at room temperature with ice, produce sufficient cooling to reach this temperature.

For more extensive information than given here relative to the freezing points of solutions, together with the literature references, see the separate tables of freezing points.

The following mixtures are among the most useful:

(a) Sodium chloride with ice for temperatures down to -21.2° .

(b) Hydrated calcium chloride, $CaCl_2 \cdot 6H_2O$, with ice, for temperatures down to -55° .

Aqueous solutions of sulfuric acid or hydrochloric acid with ice have an advantage over salts with ice in avoiding the delay incident to the solution of the salt.

CONSTANT TEMPERATURES

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Substances	Composition of mixture (% anhydrous salt, unless otherwise stated). E = eutectic composition	Freezing point of solution	Initial condition of freezing mixture	Lowest attained temperature recorded	Heat absorbed at temperature of mixing, cal per g of mixture	Heat absorbed (at freezing or saturation point of solution) from objects to be cooled, cal per g of mixture. The * values are heats of fusion of the eutectic, r. (1)
$\text{NaCl}-\text{H}_2\text{O}$ (4, 12)	22.4 (E for $\text{NaCl} \cdot 2\text{H}_2\text{O}$)	-21.2°				30.4*
	23.1 (E for NaCl)	-22.4°				
	24.8		salt and ice at -1° with ice	-21.3° -21°		
$\text{NaNO}_2-\text{H}_2\text{O}$ (12, 13)	33.3					
	37 E	-18.5°	salt and ice at -1°	-17.75°		57.5*
	42.9		water and salt 13.2°	-5.3°		
$\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}-\text{H}_2\text{O}$ (12)	5.93E	2.1°				77.2*
	16.7		salt and ice at -1°	2.0°		
$\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}-\text{H}_2\text{O}$	3.8E	-1.2°				80.1*
$\text{Na}_2\text{S}_2\text{O}_4 \cdot 5\text{H}_2\text{O}-\text{H}_2\text{O}$ (13)	30.0E	-11°				
	52.4		water and salt 10.7°	8.0°		
$\text{NaOOCCH}_2\text{H}_4\text{O}-\text{H}_2\text{O}$ (13)	45.9		water and salt 10.7°	4.7°		
	19.3	-9.0				71.2*
$\text{KCl}-\text{H}_2\text{O}$ (12)	23.1		salt -1° ice 0°	10.9°		
	11.2E	3.0°				80.7*
$\text{KNO}_3-\text{H}_2\text{O}$ (12)	11.5		salt and ice at -1°	2.85°		
	6.54E	-1.55°				
$\text{K}_2\text{SO}_4-\text{H}_2\text{O}$ (12)	9.1		salt and ice at -1°	1.9°		
	60.0		water and salt 10.8°	23.7°		
$\text{NH}_4\text{Cl}-\text{H}_2\text{O}$ (12)	18.7E	15.8°				75.0*
	20.0		salt and ice at -1°	15.1°		
$\text{NH}_4\text{NO}_3-\text{H}_2\text{O}$ (12, 13, 14)	16.6	-6°	water and salt 0° ice and salt 0°	14.0°	12.2 78.8	2.6 73.6
	31.0		ice and salt at -1°	16.75°		
	31.2	12°	water and salt 0° ice and salt 0°	-26.0°	19.7 71.6	6.8 65.6
	37.5		water and salt 13.6°	13.6°		
	41.2	17.1°				68.4*
	43.3E	-17.5°	water and salt 0° ice and salt 0°	14.9° 69.5	21.3 69.5	8.2 57.1
	40.8	-12°	water and salt 0° water and salt 20° ice and salt 0°	36.1° 12.2° 68.1	25.5 26.5 68.1	13.6 19.0 59.8
	50.3	-6°	water and salt 0° water and salt 20° ice and salt 0°	39.3° 12.2° 66.2	26.5 27.0 66.2	19.0 24.3 62.1
	51.1	0°	water and salt 0° ice and salt 0°	44.7° 64.4	28.1 64.4	28.4 94.4
	57.1	5°	water and salt 0° water and salt 20°	18.0° 13.2°		18.8
	57.1		water and salt at 13.2°			
	57.1					
	57.1					
	57.1					
	57.1					
	57.1					
$\text{NH}_4\text{SCN}-\text{H}_2\text{O}$ (12)	57.1		water and salt at 13.2°	18.0°		
$\text{Ca}_2\text{Cl}_2\text{H}_2\text{O}-\text{H}_2\text{O}$ (*)	% of hydrated salt 16.9	-4.0°	ice and salt 0°		69.9	66.2

Substances	Composition of mixture (% anhydrous salt, unless otherwise stated) E = eutectic composition	Freezing point of solution	Initial condition of freezing mixture	Lowest attained temperature recorded	Heat absorbed at temperature of mixing, cal. per g. of mixture	Heat absorbed (at freezing or saturation point of solution) from objects to be cooled, cal. per g. of mixture. The * values are heats of fusion of the eutectic, v. (8)
$\text{CaCl}_2 \cdot 6\text{H}_2\text{O} - \text{H}_2\text{O}$ (*) — <i>Continued</i>	26.8	-8.1°	ice and salt 0°		63.8	57.3
	31.6	-12.4°	ice and salt 0°		59.3	50.2
	45.7	-22.7°	ice and salt 0°		53.0	38.4
	54.9	-39.0°	ice and salt 0°		48.0	26.0
	58.81	-54.9°	ice and salt 0°		45.8	17.7
			ice and salt 0°		43.7	27.9
	63.7	-33.3°	water and salt 0°		14.4	none
			ice and salt 0°		41.9	33.2
	67.1	19.7°	water and salt 0°		15.4	6.7
			ice and salt 0°		41.0	35.0
	69.0	-14.1°	water and salt 0°		16.0	10.1
			water and salt 20°		none	1.5
			ice and salt 0°		38.7	38.7
	74.1	0°	water and salt 0°		17.7	17.7
			water and salt 20°		none	10.2
	77.5	7.6°	water and salt 0°		19.0	21.6
			water and salt 20°		none	14.7
$\text{MgSO}_4 \cdot 12\text{H}_2\text{O} - \text{H}_2\text{O}$ (*)	% anhyd. salt 19.0	-3.9°			58.2	
$\text{CuSO}_4 \cdot 5\text{H}_2\text{O} - \text{H}_2\text{O}$ (1*)	11.0	-1.6°			60.0	
$\text{ZnSO}_4 \cdot 7\text{H}_2\text{O} - \text{H}_2\text{O}$ (*)	27.2	-0.55°			50.9	
$\text{FeSO}_4 \cdot 7\text{H}_2\text{O} - \text{H}_2\text{O}$ (*)	13.0	-1.8°			67.2	
60.10% $\text{H}_2\text{SO}_4 - \text{H}_2\text{O}$ (11)	% of 60.19% H_2SO_4 7.1		ice and acid at 0°	-16°	-2.1°†	68.6
	11.2		ice and acid at 0°	-20°	-3.1°†	62.0
	17.2		ice and acid at 0°	-24°	-5.5°†	52.9
	23.9		ice and acid at 0°	-28°	-9.5°†	43.0
	33.6		ice and acid at 0°	-32°	-16.5°†	24.5
	44.2		ice and acid at 0°	-36°	-30.2°†	7.5
	47.7		ice and acid at 0°	-37°	-37°†	0
$\text{HCl} - \text{H}_2\text{O}$	% HCl 24.8E	-80°				
$\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O} - 36.60\% \text{HCl}$ (14)	% of $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ 21.05		0°		0.09	
	30.33		0°		9.17	
	36.59		0°		11.15	
	37.09		21.2°	-8.1°		
	42.37		0°		13.15	
	50.22		21.6°	-12.2°		
	62.67		15°			21.2 at 0° 12.0 at -15°
	62.96		21.6°	-15.3°		
	63.88		0°		28.89	
	74.64		15°			30.6 at 0° 19.1 at -15°
	74.68		0°		30.85	
	75.30		21.5°	-14.8°		
	78.00		0°		27.43	
	86.63		15°			24.5 at 0° 13.4 at -15°
	86.72		0°		19.44	
	88.53		20.1°	-15.6°		

† Temperature when all ice is melted

Substances	Composition of mixture (% anhydrous salt, unless otherwise stated). E = eutectic composition	Freezing point of solution	Initial condition of freezing mixture	Lowest attained temperature recorded	Heat absorbed at temperature of mixing, cal per g of mixture	Heat absorbed (at freezing or saturation point of solution) from objects to be cooled, cal per g of mixture. The * values are heats of fusion of the eutectic, e ^(b)
Na ₂ SO ₄ ·10H ₂ O—30.13% HCl ⁽¹⁴⁾	% of Na ₂ SO ₄ ·10H ₂ O					
	46.04		19.7°	-11.8°		
	49.74		19.7°	-11.8°		
	63.46		19.7°	-14.4°		
	65.23		20.4°	-15.0°		
	75.43		20.0°	-14.8°		
	82.54		19.0°	-17.2°		
	86.31		20.0°	-12.6°		
Na ₂ SO ₄ ·10H ₂ O—24.47% HCl ⁽¹⁴⁾	% of Na ₂ SO ₄ ·10H ₂ O					
	35.54		0°		12.67	
	38.16		10.0°	8.2°		
	50.42		19.8°	10.0°		
	62.22		0°		26.84	
	63.86		20.5°	-12.0°		
	67.57		0°		27.18	
	71.46		0°		25.72	
C ₂ H ₅ OH—H ₂ O ⁽¹⁰⁾	% alc					
	50	-37°	alc at 2° ice at 0°	-24.2°		
			alc at 1.5° ice at -1°	-20.4°		
CS ₂ —(CH ₃) ₂ CO						
	51.3	-38°	alc at 4° ice at 0°	ca -30°		
A temperature of -43.5° in a volume of 20 cc was maintained by mixing 100 cc of carbon disulfide and 70 cc of acetone per hour, using a heat interchanger ⁽²⁾ .						

Salts	Temperature produced by mixing salts with water	Lit.	Reduction of temperature produced by water with an equal volume of salts in equal parts (°)	Salts	Temperature produced by mixing salts with water	Lit.	Reduction of temperature produced by water with an equal volume of salts in equal parts (°)
NH ₄ Cl			14°	NaNO ₂ -KCNs	-37.4°	(1)	
NaCl			4°	KNO ₃ -NH ₄ CNS	-28.2°	(1)	
KCl			12°	NH ₄ Cl-NH ₄ NO ₂ -KNO ₃	-22.6°	(9)	
NH ₄ NO ₂			25°	NH ₄ Cl-NH ₄ NO ₂ -NaNO ₂	-30.1°	(9)	
NaNO ₂			9.5°	NH ₄ Cl-Na ₂ SO ₄ ·10H ₂ O-KNO ₃			17°-23°
KNO ₃			10°	NH ₄ Cl-(NH ₄) ₂ SO ₄ -K ₂ SO ₄	-15.2°	(9)	
NH ₄ SO ₄			8°	NH ₄ Cl-(NH ₄) ₂ SO ₄ -Na ₂ SO ₄ ·10H ₂ O	-19.9°	(9)	
Na ₂ SO ₄ ·10H ₂ O			7.5°	NaCl·2H ₂ O-NaNO ₂ -KNO ₃	-24.6°	(9)	
K ₂ SO ₄			4.5°	KCl-KNO ₃ -K ₂ SO ₄	-11.55°	(2)	
NH ₄ Cl-KNO ₃	-18.2°	(9)	20°	NH ₄ NO ₂ -KNO ₃ -NaNO ₂			16°-27°
NH ₄ Cl-NaNO ₂	-31.5°	(9)	17°	NH ₄ NO ₂ -KNO ₃ -Na ₂ SO ₄ ·10H ₂ O			17°-26°
NH ₄ Cl-NH ₄ NO ₂			22°	NH ₄ NO ₂ -(NH ₄) ₂ SO ₄ -Na ₂ SO ₄ ·10H ₂ O	-19.5°	(9)	
NH ₄ Cl-Na ₂ SO ₄ ·10H ₂ O	-17.6°	(9)	19°				
NH ₄ Cl-K ₂ SO ₄	-18.0°	(9)					
NaCl-KNO ₃			10°				
NaCl·2H ₂ O-KNO ₃	-24.9°	(9)					
KCl-NaNO ₂			11°				
KCl-NH ₄ NO ₂			20°				
NH ₄ NO ₂ -KNO ₃			22°				
NH ₄ NO ₂ -Na ₂ SO ₄ ·10H ₂ O	-19.5°	(9)	26°				
Na ₂ NO ₂ -NaSO ₄ ·10H ₂ O			10°				

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- (1) Brendel, *Dim.*, Charlottenburg; 92. (2) Brunt, *39*, **37**, 1: 537; 97. (3) Duclaux, *34*, **151**: 715; 10. (4) Gortner, *100*, **39**: 584; 14. (5) Gröber, *Dim.*, Techn. Hochschule, München; 08. (6) Hammerl, *75*, **78**: 59; 78. (7) Hanamann, *112*, **178**: 314; 64. (8) Kanolt, *48*, **9**: 416; 24. (9) Mazzotto, *72*, **22**: 545; 633; 90. (10) Moritz, *156*, **6**: 1374; 82. (11) Pfandler, *75*, **71**: 509; 75. (12) Rüdorff, *8*, **123**: 337; 64. (13) Rüdorff, *8*, **126**: 276; 69. *25*, **2**: 68; 69. (14) Szydłowski, *75*, **116**: 855; 07. (15) Tollinger, *75*, **73**: 535; 75.

2. TEMPERATURES ABOVE 0°C

OLAF A. HOUGEN AND ROLAND A. RAGATZ

(a) *Bath Liquids or Vapor Baths with Boiling under Constant External Pressure.* For heterogeneous systems and solutions *v.* (13). For fire hazards on certain of these liquids *v.* p. 61.

For a more extensive series of liquids arranged in order of boiling points *v.* p. 310

Substance	Boiling point		Actual range used	Lit.
	At 760 mm	At 100 mm		
Ethyl chloride	12.2°	31.3°	13° to 30°	(23)
Ethyl ether	34.5°	12.1°		(2, 11, 13)
Carbon disulfide	16.3°	1.8°	16° to -26°	(2, 11, 13, 24, 27, 31, 41)
Acetone	56.1°	7.5°		(13, 21)
Chloroform	61.2°	9.7°		(11, 21)
Methyl alcohol	64.5°	20.62°	65° to 49°	(2, 10, 11, 13, 21, 30)
Ethyl alcohol	78.5°	34.1°	78° to 40°	(2, 10, 11, 13, 21, 31)
Benzene	79.8°	25.8°	81° to 40°	(10, 11, 13, 30)
Water	100°	51.7°	145° to 25°	(2, 3, 9, 11, 13, 16, 18, 24, 27, 29, 30, 32, 43)
Toluene	110.5°	51.8°	130° to 70°	(10, 13, 21, 29, 32, 39, 45)
Chlorobenzene	132.1°	70.3°	132° to 70°	(31, 39)
m-Xylene	139.0°	77.8°	140° to 70°	(10, 21, 28, 32, 39, 45)
Isomyl acetate	142.5°		111° to 119°	(30, 48)
Bromobenzene	156.2°	90.7°	160° to 120°	(28, 31)
Aniline	181.4°	119.1°	181° to 150°	(27, 31, 32, 39, 42, 48)
Ethyl benzoate	213.2°	112°		(21, 27, 48)
Naphthalene	217.9°	111.3°		(28, 39)
Methyl salicylate	223.4°	151°	225° to 175°	(31)
Quinoline	237.7°	166.7°	238° to 170°	(18, 21, 39, 48)
Isomyl benzoate	262°			(21, 28, 48)
α -Bromonaphthalene	281.1°	198.8°	281° to 215°	(28, 31)
Diphenylamine	302.0°	221°		(5, 18, 28, 39, 48)
Benzophenone	305.4°	221°	306° to 257°	(28, 39)
Mercury	356.9°	261.5°	Various ranges	(2, 5, 31, 39)
Sulfur	444.6°	430.7°	Various ranges	(2, 5, 6, 39)
Phosphorus pentasulfide	52°			(5)
Zinc	907°	758°		(2)

(b) *Solid-liquid Non-variant Points.* 1. Ice-water, *v.* (11, 24, 29, 46). 2. Transformation temperatures of crystalline hydrates.

Salt	Hydration temperature °C	Lit.
Sodium chromate	19-71	(12, 33)
Sodium sulfate	32-383	(11, 12, 32, 33, 34, 35)
Sodium carbonate	35-3	(12, 33)
Sodium thiosulfate	18-0	(12, 33)
Sodium bromide	50-8	(12, 33)
Manganese chloride	57-8	(12, 33)
Trisodium phosphate	73-4	(12, 33)
Barium hydroxide	78-0	(12, 33)

(c) *Bath Liquids with Thermostatic Control*

Liquid	Useful range	Lit.
Water	0° to 90°	(17, 18, 21, 40)
Mineral oils	To 20° below the flash point	(5, 19, 22, 37, 38, 40)
Paraffin	M.P. to 300°	(5, 27, 29, 40)
10 parts cottonseed oil, 1 part beeswax	M.P. to 300°	(7)
Hydrogenated sesame oil	60° to 300°	(36)
Hydrogenated cottonseed oil	60° to 285°	(36)

Fused salts	Melting point	Lit.
NaNO ₃ (45%), KNO ₃ (55%)	218°	(8, 14, 21, 32, 44)
NaNO ₃ (55%), NaNO ₂ (45%)	221°	(44)
KNO ₃	337°	(1)
NaCl (28%), CaCl ₂ (72%)	500°	(44)
NaCl (50%), K ₂ CO ₃ (50%)	560°	(44)
Na ₂ CO ₃ (50%), KCl (50%)	560°	(44)
CaCl ₂ (50%), BaCl ₂ (50%)	600°	(44)
NaCl (35%), Na ₂ CO ₃ (65%)	620°	(44)
NaCl (22%), BaCl ₂ (78%)	654°	(44)
NaCl (44%), KCl (56%)	663°	(44)

Molten metals	Useful range	Lit.
Lead	327° to 700°	(4, 5, 6, 29)
Lead (30%), Tin (70%)	Above 183°	(14)
Lead (50%), Tin (50%)		(5)

Other liquids	Useful range	Lit.
Naphthalene	80° to 217°	(20, 21, 25)
Benzophenone	49° to 305°	(20, 21, 25)
Sulfur	113° to 444°	(20, 25)

(d) *Metal Blocks.* Aluminum and copper blocks have been used up to 600°, with a uniformity of temperature of 1° (39).

(e) *Gas Baths and Furnaces.* For temperatures above 900°, an electrically heated gas bath is usually employed, although for the higher temperatures a bath material is not essential since heat transfer takes place primarily by radiation. For lower temperatures, heat transfer and temperature uniformity are promoted by packing with a granular non-oxidizing metal.

The following references (compiled by the Geophysical Laboratory) deal with the construction and temperature regulation of high temperature furnaces: Kolovrat, *51*, 8:495; 09. Houghton and Hanson, *47*, 14:145; 15. 18:173; 17. White and Adams, *2*, 14:44; 19. Haug, *101*, 40:670; 19. Roberts, *128*, 11:409; 21. 48, 6:965; 22. Bunting, *38*, 6:1209; 23. Adams, *48*, 9:599; 24. Roberts, *48*, 10:723; 25.

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- (1) Aten, *7*, 78:13, 12. (2) Barus and Hallock, *156*, No 84:89. (3) Brown, *5*, 7:411, 79. (4) Bodenstein, *7*, 39:665, 99. (5) Bodenstein, *7*, 30:113; 99. (6) Bodenstein, *7*, 30:125, 99. (7) Bosart, *1*, 31:724; 09. (8) Day and Sosman, *8*, 38:849, 853, 12. (9) Dupre, *175*, 38:308; 13. (10) Forster, *155*, 104:80, 12. (11) Freus, Thesis, Chicago; 11. (12) Geer, *60*, 6:85; 02. (13) Golodetz, *139*, 38:1253, 14. (14) Goodwin and Mailey, *2*, 38:469, 07. (15) Gordon, *7*, 38:305; 99. (16) Grutzmacher, Deutsch. Mech.-Ztg. *1902*:193. (17) Grutzmacher, Deutsch. Mech.-Ztg. *1902*:184. (18) Grutzmacher, *89*, 8:248, 260, 00. (19) Holborn and Henning, *8*, 33:810, 07. (20) Holborn and Henning, *8*, 36:860, 08. (21) Holborn, Scheel and Henning, *865*. (22) Holborn and Schultze, *8*, 47:1101; 15. (23) Jenkin, *85*, 18:197, 22. (24) Marshall, *83*, 7:249; 11. (25) Meisner, *8*, 39:1230; 12. (26) Meyer, *18*, 168:303, 73. (27) Moser, *92*, 34:625, 21. (28) Noyes, *152*, No 63:12, 73, 194, 240, 07. (29) Ostwald-Luther, *864*, p. 100. (30) Pomphum, *245*, 11:1, 91. (31) Ramsay and Young, *4*, 47:640, 85. (32) Richards, *45*, 4:910; 12. (33) Richards and Churchill, *7*, 38:313; 99. (34) Richards and Mark, *66*, 38:417; 02. (35) Richards and Wells, *65*, 38:431, 02. (36) Robertson, *45*, 18:701, 23. (37) Rothe, *247*, 19:144; 99. (38) Shaw, *69*, 11, III:129, 17. (39) Stähler, *865*, 1:501. (40) Stähler, *865*, 1:498. (41) Stock, Henning and Kuss, *86*, 84:1110; 21. (42) Sudborough, *34*, 18:16, 99. (43) Thomsen, Scheel and Sell, *89*, 3:140; 95. (44) Tour, *212*, 6:171, 24. (45) Wiebe and Böttcher, *245*, 10:16; 90. (46) Washburn and Williams, *1*, 38:741, 13.

**MAXIMUM TEMPERATURES THAT CAN BE REACHED
AND MAINTAINED FOR OBSERVATIONAL PURPOSES
BY VARIOUS MEANS**

W. E. FORSYTHE

	Maximum temperature, °C
Electric furnaces operating in open air	
Iron tube or iron wire wound furnace	500
Nicrome wound refractory tube	800
Platinum wound refractory tube—double winding (2)	1500
Iridium tube	1900
Carbon resistor furnace	2200
Carbon arc furnace	3200
Electric furnaces operating in vacuo or inert gas	
Tungsten wound refractory tube limited by refractory tube	2000
Carbon tube furnace	2700
Tungsten tube furnace (in vacuo)	2200
Tungsten tube furnace (in inert gas)	2800
Gas-fired furnaces	
Special makes of furnaces (5) with flames entering the furnace in tangential direction so as to give a good distribution of the heat, if gas and air are well mixed, can be raised up to about	1700

	Maximum temperature °C
The regenerative furnaces, such as are used in open hearth steel furnaces, can be heated up to about the same temperature of	1700
Special furnaces and methods	
High-frequency induction furnace. Limited only by melting point of refractory or metal used	
Filament in vacuum or inert gas limited only by rate of vaporization or melting point of filament used	
Arc under pressure	
Carbon (4)	5700
Tungsten (3)	4700
Exploding fine wires by discharging a condenser charged to high voltage through them gives a temperature up to about (1)	10700

LITERATURE

(For a key to the periodicals see end of volume)

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LABORATORY METHODS FOR MAINTAINING CONSTANT HUMIDITY

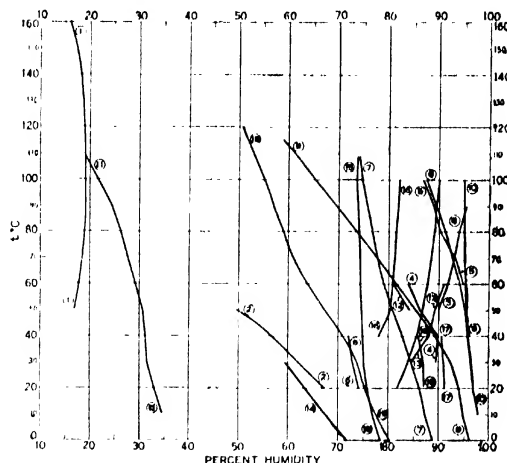
HUGH M. SPENCER

A saturated aqueous solution in contact with an excess of a definite solid phase at a given temperature will maintain a constant humidity within any enclosed space around it. By properly selecting the salt to be used almost any desired degree of humidity can be secured and controlled in this way. A number of salts suitable for this purpose are displayed in the accompanying chart and tables, together with the % humidity prevailing above their saturated solutions at different temperatures. To convert " % humidity " into " aqueous tension " multiply it by the vapor pressure of pure water at the same temperature.

SOLID PHASE

- | | |
|---|--|
| 1. $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ (19) | 11. $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ (8, 13) |
| 2. $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ (8) | 12. $\text{MgSO}_4 \cdot 6\text{H}_2\text{O}$ (7) |
| 3. $\text{CoSO}_4 \cdot 6\text{H}_2\text{O}$ (7) | 13. $\text{MnSO}_4 \cdot \text{H}_2\text{O}$ (7) |
| 4. $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$ (8, 13, 22) | 14. NH_4NO_3 (9, 18) |
| 5. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ (11, 16) | 15. NaCl (4, 5, 18, 21) |
| 6. $\text{K}_2\text{C}_2\text{H}_3\text{O}_6 \cdot \frac{1}{2}\text{H}_2\text{O}$ (4) | 16. $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$ (10, 22) |
| 7. KCl (4, 5, 9, 18, 21) | 17. $\text{Na}_2\text{C}_2\text{H}_3\text{O}_6 \cdot 2\text{H}_2\text{O}$ (14) |
| 8. KClO_3 (5, 11, 16) | 18. $\text{NaKC}_2\text{H}_3\text{O}_6 \cdot 4\text{H}_2\text{O}$ (14) |
| 9. KNO_3 (4, 5, 9, 16) | 19. NaNO_3 (4, 5, 9, 18, 21) |
| 10. K_2SO_4 (4, 5, 15, 20) | 20. Na_2SO_4 (4, 16, 24, 26) |

Solid phases	t , °C	% humidity	Lit.
$\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$	24.5	88	(15)
$\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$. . .	5	39.8	(20)
	10	38	(19)
	18.5	35	(15)
	20.0	32.3	(19)
	24.5	31	(15)
$\text{Ca(NO}_3)_2 \cdot 4\text{H}_2\text{O}$	18.5	56	(15)
	24.5	51	(15)



Solid phases	t , °C	% humidity	Lit.
$\text{CaSO}_4 \cdot 5\text{H}_2\text{O}$	20	98	(15)
CrO_3 . . .	20	35	(15)
$\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	20	76	(15)
$\text{H}_3\text{PO}_4 \cdot 4\text{H}_2\text{O}$	24.5	9	(15)
$\text{KC}_2\text{H}_3\text{O}_6$	20	20	(15)
	168	13	(11)
KBr	20	84	(15)
	100	69.2	(5)

Solid phases	$t, ^\circ\text{C}$	% humidity	Lit.	Solid phases	$t, ^\circ\text{C}$	% humidity	Lit.
$\text{K}_2\text{CO}_3 \cdot 2\text{H}_2\text{O}$	18.5	44	(15)	$\text{Na}_2\text{Cr}_2\text{O}_7 \cdot 2\text{H}_2\text{O}$	20	52	(15)
KCNS	24.5	43	(15)	NaF	100.0	96.6	(5)
K_2CrO_4	20	47	(15)	$\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$	20	95	(15)
KF	20	88	(15)	$\text{NaHSO}_4 \cdot \text{H}_2\text{O}$	20	52	(15)
K_2HPO_4	100.0	22.9	(5)	NaI	100.0	50.4	(5)
KHSO_4	20	92	(15)	NaNO_2	20	66	(15)
KI	20	86	(15)	$\text{Na}_2\text{SO}_4 \cdot 7\text{H}_2\text{O}$	20	95	(15)
KNO_3	100.0	56.2	(5)	$\text{Na}_2\text{S}_2\text{O}_4 \cdot 5\text{H}_2\text{O}$	20	78	(15)
$\text{LiCl} \cdot \text{H}_2\text{O}$	20	45	(15)	$\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$	20	93	(15)
$\text{Mg}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 4\text{H}_2\text{O}$	20	15	(15)	$\text{Pb}(\text{NO}_3)_2$	20	98	(15)
$\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$	20	65	(15)	TiCl_4	103.5	88.4	(11)
	18.5	56	(15)		100.097	99.7	(4)
NH_4Cl	24.5	52	(15)	TiNO_3	100.317	98.7	(4)
	30.0	79.2	(9)	Ti_2SO_4	104.7	84.8	(4)
	25.0	79.3	(9)	$\text{Zn}(\text{Cl}_2 \cdot 1\frac{1}{2}\text{H}_2\text{O})^*$	20	10	(15)
NH_4Cl and KNO_3	30.0	79.5	(9)	$\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$	20	42	(15)
	20.0	72.6	(9)	$\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$	5	94.7	(20)
	25.0	71.2	(9)		20	90	(15)
$\text{NH}_4\text{H}_2\text{PO}_4$	30.0	68.6	(9)				
	20.0	93.1	(9)				
	25.0	93.0	(9)				
$(\text{NH}_4)_2\text{SO}_4$	30.0	92.9	(9)				
	20.0	81.0	(9)				
	25.0	81.1	(9)				
	30.0	81.1	(9)				
	108.2	75	(11)				
NaBr	100.0	22.9	(5)				
$\text{NaBr} \cdot 2\text{H}_2\text{O}$	20	58	(15)				
NaBrO_3	20	92	(15)				
NaCl and KClO_4	16.39	36.58	(6)				
NaCl and KNO_3	16.39	32.57	(6)				
NaCl , KNO_3 and NaNO_2	16.39	30.49	(6)				
$\text{NaCl} \cdot \text{H}_2\text{O} \cdot 3\text{H}_2\text{O}$	20	76	(15)				
$\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$	18.5	92	(15)				
	24.5	87	(15)				
NaClO_2	20	75	(15)				
	100.0	54	(5)				

* Unstable at this temperature.

LITERATURE

(For a key to the periodicals see end of volume)

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BAROMETRY AND MANOMETRY

H. H. KIMBALL

1. *Gravity Correction*.—The equivalent barometric, or other manometric, height (B_s) corresponding to standard gravity ($g_s = 980.665 \text{ cm sec}^{-2}$) is related to the height (B_t) corresponding to local gravity (g_t) as shown by equation (1):

$$B_s = B_t \frac{g_t}{g_s} = B_t + C_g; \quad C_g = B_t \frac{g_t - g_s}{g_s} \quad (1)$$

When g_t and g_s are expressed in cm sec^{-2} ,

$$C_g = B_t \left[\frac{(g_t - g_s)(1.0197)}{1000} \right]$$

Any desired unit may be used for B_t ; C_g and B_s are in the same unit as B_t . [For most barometric purposes, a sufficiently accurate correction (within $\pm 0.01\%$ of B_t) is obtained by the use of the

approximate correction $C_g' = B_s \frac{g_t - g_s}{g_s}$, in which B_s is the usual barometric pressure at the station.]

Example: $B_t = 29.851$, $g_t = 978.053 \text{ cm sec}^{-2}$. Then $(g_t - g_s) = -2.612 \text{ cm sec}^{-2}$; $0.0197(g_t - g_s) = -0.0515 \text{ cm sec}^{-2}$; $1000 C_g = -2.663 B_t = -79.49$. $\therefore B_s = 29.851 - 0.079 = 29.772$.

2. *Temperature Correction*.—The equation by which the equivalent barometric, or other manometric, height (B) at the standard temperature (t_m) can be computed from the nominal height (B') at the temperature t , is generally written in the form

$$B = B' + C_t; \quad C_t = B' \frac{t(t - t_m) - m(t - t_m)^2}{1 + m(t - t_m)} \quad (2)$$

where t_m = standard temperature of the manometric liquid, t = temperature at which the scale, after correction for errors of graduation, reads correctly, m = coefficient of cubical expansion of the manometric liquid, l = coefficient of linear expansion of the material on which the scale is engraved.

The value of m which is generally used for mercury, and which has been adopted by the International Meteorological Tables, is $m = 181.8 \times 10^{-6} \text{ per } ^\circ\text{C}$. For temperatures between 0°C and 30°C this value appears (5, 6, 8, 15, 17) to be correct within $\pm 0.1 \times 10^{-6} \text{ per } ^\circ\text{C}$. The value of l , for brass, which has been adopted by the International Meteorological Tables, is $l = 18.4 \times 10^{-6} \text{ per } ^\circ\text{C}$. The best determinations (1, 2, 11) of this coefficient for temperatures between 0° and 30° yield values varying from

17.5×10^{-6} per °C to 19.3×10^{-6} per °C, or by $\pm 5\%$. For glass scales the approximate value $l = 8.5 \times 10^{-6}$ per °C is usually satisfactory. (For silicate flint glasses (13) l varies from 7.88×10^{-6} per °C to 9.35×10^{-6} per °C; for crown glasses (13) it varies from 6.75×10^{-6} to 9.54×10^{-6} per °C.

For barometers with metric scales, the combined effect of an error of $\pm 0.1 \times 10^{-6}$ per °C in m and of $\pm 0.9 \times 10^{-6}$ per °C in l

will cause an error in C_t of $\pm \frac{B't \times 10^{-6}}{1 + mt}$. For $t = 30^\circ\text{C}$ and $B' = 760$ mm, the error would be ± 0.023 mm; while for $t = 10^\circ\text{C}$, $B' = 100$ mm, it would be only ± 0.001 mm. At ordinary room temperatures, the error so produced in C_t will be less for barometers graduated in inches than for one graduated in millimeters. (For barometers graduated in inches $t_s = 62^\circ\text{F}$, $t_m = 32^\circ\text{F}$).

TABLE 1.—TEMPERATURE CORRECTION (C_t) FOR MERCURIAL MANOMETERS AND BAROMETERS

$B = B' + C_t$; (B' = nominal height at t° ; B = equivalent height for mercury at 0°C ; B , B' , and C_t are all in the same unit, which may be anything desired)

A. Brass scale correct at 62°F , inches, °F; $t_m = 32^\circ\text{F}$, $t_s = 62^\circ\text{F}$, $m = 181.8 \times 10^{-6}$ per °C, $l = 18.4 \times 10^{-6}$ per °C
 (Applies directly to commercial barometers graduated in inches)

$t(^{\circ}\text{F}) \backslash B'$	10	20	30	40	50	60	70	80	90
+12	+0.015	+0.030	+0.045	+0.061	+0.076	+0.091	+0.106	+0.121	+0.136
22	+0.006	+0.012	+0.018	+0.024	+0.030	+0.036	+0.042	+0.048	+0.054
32	-0.003	-0.006	-0.009	-0.012	-0.015	-0.018	-0.021	-0.024	-0.028
42	-0.012	-0.024	-0.036	-0.049	-0.061	-0.073	-0.085	-0.097	-0.109
52	-0.021	-0.042	-0.064	-0.085	-0.106	-0.127	-0.148	-0.169	-0.191
62	-0.030	-0.060	-0.091	-0.121	-0.151	-0.181	-0.211	-0.242	-0.272
72	-0.039	-0.078	-0.118	-0.157	-0.196	-0.235	-0.275	-0.314	-0.353
82	-0.048	-0.096	-0.145	-0.193	-0.241	-0.289	-0.338	-0.386	-0.434
92	-0.057	-0.114	-0.172	-0.229	-0.286	-0.343	-0.400	-0.458	-0.515

B. Brass scale correct at 0°C , millimeters, °C; $t_m = t_s = 0^\circ\text{C}$, $m = 181.8 \times 10^{-6}$ per °C, $l = 18.4 \times 10^{-6}$ per °C

$t(^{\circ}\text{C}) \backslash B'$	100	200	300	400	500	600	700	800	900
-10	+0.16	+0.33	+0.49	+0.65	+0.82	+0.98	+1.15	+1.31	+1.47
-5	+0.08	+0.16	+0.25	+0.33	+0.41	+0.49	+0.57	+0.65	+0.74
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
+5	-0.08	-0.16	-0.24	-0.33	-0.41	-0.49	-0.57	-0.65	-0.73
10	-0.16	-0.33	-0.49	-0.65	-0.82	-0.98	-1.14	-1.30	-1.47
15	-0.24	-0.49	-0.73	-0.98	-1.22	-1.47	-1.71	-1.96	-2.20
20	-0.33	-0.65	-0.98	-1.30	-1.63	-1.95	-2.28	-2.60	-2.93
25	-0.41	-0.81	-1.22	-1.63	-2.03	-2.44	-2.85	-3.25	-3.66
30	-0.49	-0.98	-1.46	-1.95	-2.44	-2.93	-3.41	-3.90	-4.39
35	-0.57	-1.14	-1.70	-2.27	-2.84	-3.41	-3.98	-4.55	-5.11
40	-0.65	-1.30	-1.95	-2.60	-3.24	-3.89	-4.54	-5.19	-5.84

C. Glass scale correct at 0°C , $t_m = t_s = 0^\circ\text{C}$, $m = 181.8 \times 10^{-6}$ per °C, $l = 8.5 \times 10^{-6}$ per °C

$t(^{\circ}\text{C}) \backslash B'$	100	200	300	400	500	600	700	800	900
-10	+0.17	+0.35	+0.52	+0.69	+0.87	+1.04	+1.22	+1.39	+1.56
-5	+0.09	+0.17	+0.26	+0.35	+0.43	+0.52	+0.61	+0.69	+0.78
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
+5	-0.09	-0.17	-0.26	-0.35	-0.43	-0.52	-0.61	-0.69	-0.78
10	-0.17	-0.35	-0.52	-0.69	-0.86	-1.04	-1.21	-1.38	-1.56
15	-0.26	-0.52	-0.78	-1.04	-1.30	-1.56	-1.81	-2.07	-2.33
20	-0.34	-0.69	-1.04	-1.38	-1.73	-2.07	-2.42	-2.76	-3.11
25	-0.43	-0.86	-1.29	-1.73	-2.16	-2.59	-3.02	-3.45	-3.88
30	-0.52	-1.03	-1.55	-2.07	-2.59	-3.10	-3.62	-4.14	-4.65
35	-0.60	-1.21	-1.81	-2.41	-3.01	-3.62	-4.22	-4.82	-5.42
40	-0.69	-1.38	-2.06	-2.75	-3.44	-4.13	-4.82	-5.51	-6.19

Example: Barometer graduated in inches, brass scale correct at 62°F ; $B' = 29.564$ in., $t = 76.8^\circ\text{F}$. From section A it is found that at 72° , C_t for $B' = 29.564$ is -0.1155 , at 82° it is -0.1421 ; hence at 76.8° , $C_t = -0.1155 + \frac{4.8}{10}(-0.0266) = -0.1155 - 0.0128 = -0.128$. Hence $B = 29.564 - 0.128 = 29.436$ in.

3. Capillary Corrections.—The curvature of the surfaces of the manometric liquid introduces pressures directed towards the centers of curvature of the surfaces. For each surface, this pressure is

$$\gamma \left(\frac{1}{r_1} + \frac{1}{r_2} \right) \text{ dynes cm}^{-2} = \frac{\gamma}{d} \left(\frac{1}{r_1} + \frac{1}{r_2} \right) \text{ cm of the manometric liquid.}$$

[γ = surface tension (in dynes cm^{-1}), d = density of the liquid (in g cm^{-3}), g is the acceleration of gravity (in cm sec^{-2}), and r_1 and r_2 are the principal radii of curvature (in cm) of the surface at the point considered.] At the vertex of the meniscus in a tube of circular section, $r_1 = r_2 = r$, and if the angle of contact of the liquid with the tube is either 0° or 180° , and if the tube is not too large, r is practically equal to the internal radius of the tube. If

the liquid surface is in an annular space between coaxial, circular cylinders (as in the reservoir of a Fortin barometer), if the angle of contact is 0° , and if neither r_1 nor $(r_1 - r_2)$ is very great as compared with the capillary constant, (16), then $h' = \frac{2dhr_1}{(r_1 - r_2)^2}$ approximately; h' and h are the respective capillary pressures (in terms of unit column of the liquid) at the vertices of the surfaces in the annular space of width $(r_1 - r_2)$, and in a tube of radius r_1 ; and d is the depth of the annular meniscus.

Laplace (12) has shown that, except for sign, the equations for a convex meniscus are the same as those for a concave one. Hence, this expression can probably be accepted as a first approximation to the value for h' for any liquid, provided that the angle of contact of the liquid with the solid is the same at all three surfaces, and that r_1 and $(r_1 - r_2)$ are not too great. In the case of the ordinary mercurial cistern barometers, $(r_1 - r_2)$ is quite large as compared with the capillary constant of mercury, and the angles of contact may not be the same at all three surfaces; for these reasons, no great confidence can be placed in the actual value of h' , as so computed, for such barometers, but its order of magnitude will probably be correct.

TABLE 2. CAPILLARY DEPRESSION OF THE APEX OF A MERCURIAL COLUMN IN A GLASS TUBE OF CIRCULAR SECTION*

Depression in millimeters		Radius of the tube, mm															
		Height of the meniscus, mm															
		0	2	4	6	8	10	12	14	16	18						
1.0	2.16	1.40															
1.4	1.26	2.36	3.22														
1.8	0.75	1.41	2.02	2.48													
2.2	0.19	0.95	1.36	1.70	1.98												
2.6	0.34	0.66	0.96	1.22	1.44	1.61											
3.0	0.24	0.48	0.70	0.90	1.07	1.21	1.32										
3.5	0.17	0.34	0.49	0.64	0.76	0.87	0.96	1.04									
4.0	0.12	0.24	0.35	0.46	0.56	0.64	0.71	0.77	0.82								
4.5	0.09	0.18	0.26	0.34	0.41	0.47	0.53	0.58	0.62								
5.0	0.07	0.13	0.19	0.25	0.30	0.35	0.40	0.44	0.47								
5.5	0.05	0.10	0.14	0.19	0.23	0.27	0.30	0.33	0.36								
6.0	0.04	0.07	0.11	0.14	0.18	0.20	0.23	0.25	0.27								
6.5	0.03	0.06	0.09	0.11	0.14	0.16	0.18	0.20	0.21								
7.0	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.15	0.16								

* From the Schlegelmacher-Delors (4, 5, 16) table, as revised by Söhring (14). The values are about 5% larger than those obtained from Bravais's (2) table, in which the arguments are the diameter of the tube, and the angle of incidence of the meniscus of the mercurial column with the walls of the tube.

Example. In a barometer cistern for which $r_2 = 6$ mm, $r_1 = 16$ mm, d was found to be 0.5 mm; the radius of the barometer tube was $r_1 = 5$ mm, and the height of the meniscus in it was 1.0 mm. From Table 2 it is found that the depression h , due to the meniscus in the 5 mm tube, is 0.30 mm; hence $h' = 0.015$ mm. That is, the pressure due to the annular surface is of the order of 0.02 mm; and the total depression of the column is $H = 0.30 - 0.02 = 0.28$ mm, subject to the uncertainty regarding the actual value of h' .

4. *Possible Residual-gas Error in Good Barometers.*—Under ordinary laboratory conditions, errors amounting to as much as 4.1 mm (0.163 in.) have been observed, and errors of 1.1 mm (0.043 in.) are not uncommon; but in most barometers, this error

does not exceed 0.25 mm (0.010 in.) when the instrument is shipped by the manufacturer. Air may be introduced during shipment and by handling. The smaller the tube of the barometer, the more likely is the error to be large. The magnitude of the error varies with the temperature and with the volume of the space above the mercury column, as indicated by equation (3):

$$x = x_0 \frac{V_0}{V} [1 + 0.00367(t - t_0)] \quad (3)$$

where x_0 and x are, respectively, the errors corresponding to the volume V_0 temperature t_0 , and to the volume V temperature t ; temperatures being expressed in $^\circ\text{C}$.

5. *Conversion of Water Column at $t^\circ\text{C}$ to the Equivalent Water Column at 4°C .*—If h_i and h_4 are the equivalent true heights (corrected for scale errors of graduation and expansion, and for capillary pressures), and if d_i and d_4 are the respective densities (7, 16) then, if $\delta = (d_4 - d_i)/d_4$, $h_4 = h_i(1 - \delta)$.

TABLE 3.—VALUES OF 100 δ

t ($^\circ\text{C}$)	Units of t				
	0	2	4	6	8
tens					
0	0.013	0.003	0.000	0.003	0.012
1	0.027	0.048	0.073	0.103	0.138
2	0.177	0.221	0.268	0.320	0.375
3	0.435	0.497	0.563	0.633	0.706

Example.— $h_{25} = 67.53$ cm. At 25° , $100\delta = 0.294$. $\therefore \delta h_{25} = 0.199$, $h_4 = h_{25}(1 - \delta) = 67.53 - 0.20 = 67.33$ cm.

6. *Conversion of Water Column at 4°C to Equivalent Mercury Column at Standard Density (13.5951 g cm $^{-3}$); and the Reverse.*—If h_w and h_m are the equivalent true heights (corrected for the scale errors of graduation and expansion, and for all capillary effects) of the water and the mercury, respectively, $h_m = 0.073554h_w$.

TABLE 4. EQUIVALENT COLUMNS OF WATER (h_w) AND OF MERCURY (h_m)

(Density of water = 0.999973 g cm $^{-3}$; of mercury = 13.5951 g cm $^{-3}$)

h_w	h_m	h_w	h_m	h_w	h_m	h_w	h_m
100	7.3554	600	44.132	1	13.5955	6	81.573
200	14.7108	700	51.488	2	27.1909	7	95.168
300	22.0662	800	58.843	3	40.7864	8	108.764
400	29.4216	900	66.199	4	54.3818	9	122.359
500	36.7770	1000	73.551	5	67.9773	10	135.955

LITERATURE

(For a key to the periodicals see end of volume)

- (1) Bern, 88, 14: 1113; 12 (2) Benoit, 238, 6: 190, 88. (3) Bravais, 6, 5: 492, 42 (4) Bravais and Martins, 239, 14: 47, 41 (5) Broch, 238, 2: 21, 83 (6) Chappuis, 238, 13: 28, 07 (7) Chappuis, 238, 13D: 39; 07. (8) Chappuis, 238, 16: 31, 17 (9) Delors, Annuaire Météorologique de la France, 169-170; 10. (10) Delors, 240, 8: 3; 18 (11) Dittenberger, 98, 46: 1535; 02. (12) Laplace, Mécanique Céleste (Bowditch translation) 4: 737 (13) Pulfrich, 8, 48: 661; 92 (14) Söhring, Ber. u. d. Tätigk. d. Kgl. Preuss. Meteor. Inst., 24-42; 16 (15) Thiessen, 89, 4: 4, 01 (16) Thiessen, Sched. and Dusselhorst, 89, 2: 68; 00 (17) Thiessen, Sched. and Sell, 89, 2: 180; 95. (18) Verschaefelt, 168, No. 32. 64V, 24: 175; 88.

PSYCHROMETRY; DENSITY OF MOIST AIR; CHANGE IN BAROMETRIC PRESSURE WITH ALTITUDE

F. W. J. WHIPPLE

$B; B_a$	Barometric pressure, in general; at h
C	Instrumental constant
$d; d_h; d_a$	Density of air, in general; at h ; at T_a and A_a
$e; e'$	Pressure of water vapor, present; when in equilibrium with water (or ice) at temperature t'
$g; g_a$	Acceleration of gravity, actual; standard value
$h; H$	Altitude above sea level, cm; meters
$t; t'$	Readings of dry bulb; of wet bulb
$T; T_a; T'$	Absolute temperatures in °C, general; of ice point, "virtual"
x	Ratio (mass of vapor)/(mass of dry air)

1. Psychrometry.—The pressure of the water vapor contained in the air is commonly deduced from the simultaneous readings of wet bulb and of dry bulb thermometers. The difference in these two readings depends upon the heat received by radiation as well as upon that furnished directly by the air. When the air flow is slow, the radiation is an important factor. In the Assmann psychrometer the bulb is surrounded by a double metal sheath; this largely eliminates radiation effects. It is important to secure adequate ventilation by the use of a thermometer with a bulb much smaller than the sheath. The standard bulb is 12 mm long and 4 mm in diameter. Alternatively, the thermometers may be "slung," i.e., whirled on a suitable holder. In this case, direct radiation from sun or sky should be avoided as it affects the dry-bulb readings and therefore the psychrometric difference.

The general formula for the computation of vapor pressure is

$$e' - e = CB(t - t') \times 10^{-4}$$

B , e , and e' are expressed in the same units, which may be anything desired. Within the order of accuracy of psychrometer observations, C is constant for a given velocity of the air-flow past the wet bulb. The relation of C to the air velocity has not been determined very precisely. The variation of C with temperature is negligible. If temperatures are expressed in °C, the value of C for thermometers with adequate ventilation (a relative velocity of 3 m per second or more) is 6.6 when the cover of the wet-bulb is saturated with water. On theoretical grounds, a lower factor, 5.8, is appropriate for an ice-covered bulb, but in the tables in general use 6.6 is adopted in this case as well. (Aspirations Psychrometer Tafeln, Braunschweig, 1908. Ferrel, Report of Chief Signal Officer, p. 218. Washington, 1886.) For the reduction of the readings of thermometers exposed in a Stevenson screen, Regnault's values of C , 8 for water and 7 for ice, are generally recommended (Études sur l'Hygrométrie, p. 102. Paris, 1845.) As, however, the ventilation is indeterminate, the accuracy obtainable is of a lower order.

Relative Humidity is computed by expressing e , determined by the psychrometric formula, as a percentage of the pressure of vapor in equilibrium with water (not ice) at the temperature of the dry bulb.

2. Density of Moist Air*

T, T_a = absolute temperature in °C

* If d_a, d_a = density of vapor and of dry air at same pressure and temperature, $d_a/d_a = 0.6217$ and $(d_a - d_a)/d_a = 0.3783$.

Pressure unit	d
Any unit	$d = \frac{T_a}{T} \left(\frac{B - 0.3783e}{A_a} \right);$ $d = \frac{T_a}{TB_a} \left(\frac{0.6217(1+x)}{0.6217+x} \right)$
Min Hg	$\frac{461.6}{10^6} \left(\frac{B - 0.3783e}{T} \right) \text{g/cm}^3;$ $\frac{288.9}{10^6} \left(\frac{B(1+x)}{(0.6217+x)T} \right) \text{g/cm}^3$
Kilodynes per cm ²	$\frac{318.5}{10^6} \left(\frac{B - 0.3783e}{T} \right) \text{g/cm}^3$ $\frac{216.7}{10^6} \left(\frac{B(1+x)}{(0.6217+x)T} \right) \text{g/cm}^3$

$$x = \frac{\text{mass of vapor}}{\text{mass of dry air}} = \frac{0.6217 e}{B - e}$$

Tables in Dictionary of Applied Physics 3: 70, and in paper by Shaw and Fahmy in Quart. J. Roy. Meteorological Soc., 1923, 210

$$\text{Specific humidity} = \frac{\text{mass of vapor}}{\text{total mass}} = \frac{0.6217 e}{B - 0.3783 e}$$

3. Relations Connecting Pressure and Altitude.—V. Bjerknes defines "virtual" temperature (T') as $T' = TB/(B - 0.3783e)$.

$$\frac{dB}{B} = d(\log B) = -\frac{g}{B} dh = -0.03416 \frac{g}{g_a} \frac{dT'}{T'} = -\frac{g}{29.26 g_a} \frac{dT'}{T'} \quad (1)$$

$$d(\log_{10} B) = -\frac{0.014842 g}{g_a} \frac{dT'}{T'} = -\frac{g}{67.38 g_a} \frac{dT'}{T'} \quad (2)$$

If suffix ₁ refers to the lower station and ₂ to the upper, then

$$\log_{10} \frac{B_1}{B_2} = 0.014842 \frac{g}{g_a} \frac{2(H_2 - H_1)}{T'_{11} + T'_{22}}, \text{ approx.} \quad (3)$$

$$B_1 = B_2 \left[1 + 0.03416 \frac{g}{g_a} \frac{2(H_2 - H_1)}{T'_{11} + T'_{22} - 0.03416 (H_2 - H_1) \frac{g}{g_a}} \right], \text{ approx.} \quad (4)$$

$$H_2 - H_1 = \frac{29.26 g_a}{g} \frac{B_1 - B_2}{B_1 + B_2} (T'_{11} + T'_{22}), \text{ approximately.} \quad (5)$$

For $(H_2 - H_1)$ not exceeding 1000 m, equations (4) and (5) are equivalent to the logarithmic formula. The factor $g/g_a = (1 - 0.002610 \cos 2\phi)(1 - 3.14H \times 10^{-7})$ may generally be taken as unity. The distinction between virtual and actual temperature may be ignored except when high temperatures are involved.

In the determination of heights in an extended barometric survey of a country, allowance must be made for the horizontal pressure gradient. When daily weather maps are available, B_1 may be taken from them as the pressure at sea-level in the neighborhood. If T_1 is not known, the conventional value (adopted by Intern. Meteorological Conference, Innsbruck, 1905) $T_1 = T_2 + 0.005 (H_2 - H_1)$ may be used, but in hot weather $T_1 = T_2 + 0.01 (H_2 - H_1)$ is a better approximation. Value of T_2 observed at a mountain station may differ considerably from the temperature of free atmosphere at same level; this is especially true in calm weather, at night, and in the early morning. (cf. Hesselberg, Int. Meteorol. Conference, Utrecht, 1923, App. L.) Tables of

virtual temperatures: V. Bjerknes, *Dynamic Meteorology*, etc., Washington, 1911. Values of $0.01484/T$: *Computer's Handbook of Meteorological Office*, London, 2: 45.

Graduation of Aneroids.—The height scales on aneroids designed for the use of travellers, are graduated on the assumption that the temperature of the atmosphere is constant and independent of the altitude. Various standard temperatures, such as 50°F and 0°C have been used. For such scales, especially when applied to aircraft use, the difference between the indicated and the true height may be excessive.

The International Commission for Aerial Navigation adopted in 1925 a scale based on the following conventions (*cf.* *Dict. Applied Physics* 3: 182): (a) Pressure at sea-level is $A_0 = 1.0132 \times 10^6$ dynes/cm²; (b) temperature at sea-level is 15°C ; (c) temperature decreases by 6.5°C per km, up to 11 km; and above 11 km is constant at -56.5°C ; (d) humidity may be ignored; (e) value of g is same at all heights and $= g_0$ (essentially g). Whence, denoting the pressure and density at sea-level by B_1 and d_1 ; those at 11 000 m by $B_{11\ 000}$ and $d_{11\ 000}$:

$$B_1 = \left(\frac{288 - 0.0065 H}{288} \right)^{5.256}; \quad d_1 = \left(\frac{288 - 0.0065 H}{288} \right)^{4.186};$$

if $H \geq 11\ 000\ \text{m}$.

$$\log_{10} \frac{B_{11\ 000}}{B} = \log_{10} \frac{d_{11\ 000}}{d} = \frac{H - 11\ 000}{14\ 600}, \text{ if } H > 11\ 000\ \text{m}$$

	Unit	Value	Log ₁₀
B_1	mm	760	2.88081
B_1	kilodyne/cm ²	1013.2	3.00570
d_1	g/m ³	1226	3.08849
$B_{11\ 000}$	mm	169.6	2.22943
$B_{11\ 000}$	kilodyne/cm ²	226.1	2.35432
$d_{11\ 000}$	g/m ³	364	2.56104

As the regulations drawn up by the I. C. A. N. are ambiguous, attention must be drawn to the fact that whilst the altimeter reading, H , gives the pressure uniquely, it cannot give the temperature and density of the air. Hence the formulae for d are on quite a different footing from those for B . (*Cf.* Section on Aerodynamics, Ed.)

VOLUMES OF LIQUID MENISCI

F. A. GOULD

As used in this section, the volume (V_m) of the liquid meniscus in a vertical, circular cylinder = volume of the liquid which lies below the capillary surface and between two horizontal planes, one tangent to the meniscus, and the other passing through the line in which the meniscus meets the wall of the tube. The value of V_m depends upon the surface tension (γ), the acceleration of gravity (g), the difference (ρ) in the densities of the fluids separated by the surface, the radius (r) of the cylinder, and the angle (θ) at which the capillary surface meets the wall of the cylinder. If θ is variable and not too small, it is more convenient to use the height (h_m) of the meniscus (= distance between the planes mentioned), than θ , as one of the variables. This has been done in Tables 1 and 2, which give the volume of the mercury meniscus for $\gamma = 400\ \text{mg wt./cm}$ ($\approx 392.27\ \text{dynes/cm}$, $g = 980.665$), $\rho =$

$13.55\ \text{g/cm}^3$. This value of γ is close to the mean of the values corresponding to the experimental determinations of V_m by Scheel and Heuse (8, 33: 295; 10) (425 mg/cm), and by Palacios (139, 17: 295; 19, 63, 24: 152; 23) (406 to 326 mg/cm); an idea of the error which is associated with a departure of the actual value of γ from that assumed may be obtained by comparing their values with those here given. (*See also* Schalkwijk, 168, No. 67, and 64 V, 8: 462; 00. 9: 512; 01.)

If $\theta = 0$, it is convenient to tabulate the dimensionless quantities V_m/r^3 and $h_c/r = V_m/\pi r^3$ as functions of $g\rho r^3/\gamma$, as is done in Table 3. [$g\rho r^3/\gamma = r^3/a_1^3$, where a_1 is capillary constant (British usage), *see* section Technical Terms (p. 34); h_c = length of circular cylinder of radius r and volume V_m].

TABLE 1.—VOLUME (V_m) OF MERCURY MENISCUS

h_m = height of meniscus, d = internal diameter of tube. Accuracy for the larger menisci = 0.3%, for the smaller = 1%. Unit of $V_m = 0.001\ \text{cm}^3$; of h_m and $d = 1\ \text{mm}$. Assumes $\gamma = 400\ \text{mg wt./cm}$

h_m	d	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	d	h_m
0.1	0.040	0.159	0.360	0.646	1.02	1.50	2.08	2.75	3.55	4.46	5.49	6.67	7.97	9.42	11.1	12.8	14.8	16.9	19.0	21.6	24.2	27.0	30.0	33.1	0.1	0.1	
0.2	0.083	0.321	0.723	1.30	2.05	3.00	4.16	5.53	7.12	8.95	11.0	13.4	16.0	18.9	22.2	25.7	29.6	33.9	38.5	43.4	48.6	54.1	60.0	66.3	0.2	0.2	
0.3	0.134	0.190	1.00	1.95	3.09	4.52	6.26	8.32	10.7	13.5	16.6	20.2	24.1	28.5	33.4	38.7	44.6	51.0	57.8	65.2	73.0	81.3	90.2	99.6	0.3	0.3	
0.4	0.195	0.669	1.47	2.63	4.14	6.04	8.37	11.1	14.3	18.0	22.3	27.0	32.3	38.1	44.7	51.8	59.6	68.1	77.3	87.1	97.5	109.1	120.8	133	0.4	0.4	
0.5	0.261	0.861	1.87	3.31	5.21	7.59	10.5	14.0	18.0	22.7	28.0	33.9	40.6	47.9	56.1	65.0	74.7	85.4	96.9	109.5	122.5	136	151	167	0.5	0.5	
0.6	1.07	2.29	4.01	6.30	9.16	12.7	16.8	21.7	27.3	33.7	40.9	48.9	57.8	67.6	78.3	90.0	103	117	131	147	164	181	200	0.6	0.6		
0.7	1.31	2.72	4.74	7.43	10.8	14.9	19.7	25.4	32.0	39.5	47.9	57.4	67.8	79.2	91.7	105	120	136	154	172	191	212	234	0.7	0.7		
0.8	1.56	3.17	5.50	8.58	12.4	17.1	22.6	29.2	36.8	45.4	55.1	65.0	77.8	91.0	105	121	138	156	176	197	219	243	268	0.8	0.8		
0.9	1.85	3.67	6.29	9.77	14.1	19.4	25.6	33.0	41.6	51.4	62.3	74.5	88.0	103	119	137	156	177	199	222	248	274	303	0.9	0.9		
1.0	2.19	4.19	7.12	11.0	15.8	21.7	28.6	36.9	46.5	57.3	69.6	83.2	98.3	115	133	153	174	197	222	248	276	306	337	1.0	1.0		
1.1	2.59	4.76	7.99	12.3	17.6	24.1	31.8	40.9	51.4	63.5	77.0	92.1	109	127	147	169	192	218	245	274	305	338	372	1.1	1.1		
1.2	3.09	5.39	8.90	13.6	19.5	26.6	35.0	44.9	56.5	69.7	84.5	101	119	139	161	185	211	238	268	300	334	369	407	1.2	1.2		
1.3	3.67	6.07	9.88	15.0	21.4	29.1	38.2	49.1	61.7	76.0	92.1	110	130	152	176	201	229	260	292	326	363	402	443	1.3	1.3		
1.4	4.34	7.09	11.4	17.4	24.4	32.7	42.7	54.3	67.9	83.4	101.1	121.1	143.1	167.1	193.1	221.1	250.1	281.1	313.1	346.1	380.1	415.1	451.1	1.4	1.4		
1.5	5.11	8.19	12.9	19.9	27.4	36.5	47.5	59.9	74.1	90.1	108.1	129.1	152.1	177.1	205.1	235.1	268.1	303.1	339.1	376.1	414.1	453.1	493.1	1.5	1.5		
1.6	5.99	9.34	14.3	21.9	29.9	39.5	50.9	63.9	78.9	95.9	116.1	138.1	163.1	190.1	220.1	253.1	287.1	323.1	360.1	398.1	437.1	477.1	518.1	1.6	1.6		
1.7	6.99	10.6	16.1	24.1	32.6	43.1	55.1	68.1	83.1	100.1	121.1	144.1	170.1	200.1	234.1	272.1	312.1	354.1	398.1	443.1	489.1	536.1	584.1	1.7	1.7		
1.8	8.11	12.3	18.6	27.1	36.1	47.1	59.6	73.6	89.6	108.1	130.1	154.1	181.1	211.1	245.1	283.1	323.1	365.1	409.1	454.1	500.1	547.1	595.1	1.8	1.8		
1.9	9.34	13.8	20.6	29.6	39.1	50.1	62.6	76.6	92.6	111.1	133.1	158.1	185.1	215.1	249.1	287.1	327.1	369.1	413.1	458.1	504.1	551.1	599.1	1.9	1.9		
2.0	10.7	15.4	22.6	32.1	42.1	53.1	65.6	79.6	95.6	114.1	137.1	162.1	189.1	219.1	253.1	291.1	331.1	373.1	417.1	462.1	508.1	555.1	603.1	2.0	2.0		
2.1	12.3	17.4	25.1	35.1	45.6	57.1	69.6	83.6	99.6	119.1	142.1	167.1	194.1	224.1	260.1	299.1	340.1	383.1	428.1	474.1	521.1	569.1	618.1	2.1	2.1		
2.2	14.1	19.6	27.6	38.1	49.1	61.1	74.1	88.1	104.1	124.1	148.1	174.1	202.1	232.1	266.1	304.1	344.1	386.1	429.1	474.1	521.1	569.1	618.1	2.2	2.2		
2.3	16.1	21.6	30.1	41.1	52.1	64.1	77.1	91.1	107.1	127.1	152.1	178.1	206.1	236.1	270.1	308.1	348.1	390.1	434.1	479.1	525.1	573.1	622.1	2.3	2.3		
2.4	18.1	23.6	32.6	43.6	54.6	66.6	80.6	95.6	112.6	133.6	158.6	184.6	212.6	242.6	276.6	314.6	354.6	396.6	440.6	485.6	532.6	580.6	629.6	2.4	2.4		
2.5	20.1	25.6	34.6	45.6	56.6	68.6	82.6	97.6	114.6	135.6	160.6	186.6	214.6	244.6	278.6	316.6	356.6	398.6	442.6	487.6	534.6	582.6	631.6	2.5	2.5		

TABLE 2.—HEIGHT (h_c) OF CYLINDER EQUIVALENT TO VOLUME (V_m) OF MERCURY MENISCUS

$h_c = V_m/\pi r^2$ = length of tube of radius r and volume V_m ; h_m = height of meniscus; $d = 2r$ = diameter of tube. Accuracy and basis are same as for Table 1

Unit of h_c , h_m , and d = 1 mm. Assumes $\gamma = 400$ mg wt./cm

$h_m \sim d$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	d/h_m
0.1	0.0510	0.0510	0.0510	0.0510	0.0520	0.0530	0.0540	0.0550	0.0560	0.0570	0.0580	0.0590	0.0600	0.0610	0.0630	0.0640	0.0650	0.0660	0.0680	0.0690	0.0700	0.0710	0.0720	0.073	0.1
0.2	0.1060	0.1020	0.1020	0.1030	0.1040	0.1060	0.1080	0.1100	0.1120	0.1140	0.1160	0.1180	0.1210	0.1230	0.1260	0.1280	0.1310	0.1330	0.1360	0.1380	0.1400	0.1420	0.1440	0.147	0.2
0.3	0.1710	0.1560	0.1550	0.1550	0.1570	0.1600	0.1630	0.1650	0.1680	0.1720	0.1750	0.1780	0.1820	0.1850	0.1890	0.1920	0.1960	0.2000	0.2040	0.2080	0.2110	0.2140	0.2170	0.220	0.3
0.4	0.2480	0.2130	0.2090	0.2090	0.2110	0.2140	0.2180	0.2210	0.2250	0.2300	0.2340	0.2390	0.2430	0.2480	0.2530	0.2570	0.2630	0.2680	0.2730	0.2770	0.2810	0.2860	0.2900	0.294	0.4
0.5	0.2740	0.2650	0.2630	0.2650	0.2680	0.2730	0.2780	0.2830	0.2880	0.2940	0.3000	0.3060	0.3110	0.3180	0.3230	0.3290	0.3360	0.3420	0.3480	0.3530	0.3580	0.3630	0.368	0.5	
0.6	0.3410	0.3230	0.3190	0.3210	0.3240	0.3290	0.3350	0.3410	0.3480	0.3550	0.3620	0.3680	0.3750	0.3830	0.3890	0.3970	0.4040	0.4110	0.4180	0.4210	0.4300	0.4370	0.443	0.6	
0.7	0.4180	0.3850	0.3770	0.3780	0.3810	0.3860	0.3920	0.4000	0.4080	0.4160	0.4240	0.4320	0.4400	0.4480	0.4560	0.4650	0.4730	0.4810	0.4800	0.4900	0.5040	0.5110	0.518	0.7	
0.8	0.4970	0.4490	0.4380	0.4370	0.4400	0.4440	0.4500	0.4590	0.4680	0.4780	0.4870	0.4960	0.5060	0.5150	0.5240	0.5330	0.5420	0.5510	0.5610	0.5690	0.5770	0.5850	0.593	0.8	
0.9	0.5880	0.5190	0.5010	0.4970	0.4990	0.5030	0.5100	0.5190	0.5300	0.5400	0.5510	0.5610	0.5720	0.5820	0.5920	0.6020	0.6130	0.6230	0.6330	0.6420	0.6510	0.6600	0.669	0.9	
1.0	0.5930	0.5670	0.5590	0.5600	0.5630	0.5700	0.5800	0.5920	0.6040	0.6150	0.6270	0.6380	0.6500	0.6610	0.6730	0.6840	0.6950	0.7060	0.7160	0.7260	0.7360	0.746	1.0		
1.1	0.6740	0.6360	0.6240	0.6230	0.6260	0.6320	0.6430	0.6550	0.6680	0.6810	0.6940	0.7060	0.7190	0.7310	0.7430	0.7560	0.7670	0.7790	0.7900	0.8020	0.8120	0.823	1.1		
1.2	0.7620	0.7080	0.6920	0.6890	0.6910	0.6960	0.7070	0.7200	0.7330	0.7470	0.7610	0.7750	0.7880	0.8020	0.8150	0.8280	0.8410	0.8540	0.8660	0.8780	0.8890	0.900	1.2		
1.3	0.8590	0.7860	0.7630	0.7570	0.7610	0.7720	0.7850	0.7990	0.8150	0.8300	0.8440	0.8580	0.8730	0.8870	0.9020	0.9150	0.9290	0.9420	0.9550	0.9670	0.979	1.3			
1.4	0.8960	0.8370	0.8260	0.8250	0.8290	0.8390	0.8520	0.8670	0.8830	0.8990	0.9150	0.9300	0.9460	0.9610	0.9760	0.9910	1.01	1.02	1.03	1.05	1.06	1.06	1.4		
1.5	0.9610	0.9150	0.8990	0.9000	0.9080	0.9200	0.9360	0.9530	0.9690	0.9860	1.00	1.02	1.04	1.05	1.07	1.08	1.10	1.11	1.13	1.14	1.15	1.5			
1.6	1.06	1.00	0.9760	0.9690	0.9720	0.9800	0.9910	1.01	1.02	1.04	1.06	1.08	1.10	1.11	1.13	1.15	1.16	1.18	1.19	1.21	1.22	1.22	1.6		
1.7	1.09	1.06	1.04	1.05	1.05	1.06	1.08	1.10	1.12	1.13	1.15	1.17	1.19	1.21	1.23	1.25	1.27	1.29	1.31	1.32	1.34	1.36	1.37	1.7	
1.8	1.18	1.14	1.12	1.12	1.13	1.14	1.15	1.17	1.19	1.21	1.23	1.25	1.27	1.29	1.31	1.33	1.35	1.37	1.39	1.40	1.42	1.44	1.46	1.47	1.8
1.9	1.23	1.21	1.20	1.21	1.22	1.23	1.25	1.27	1.29	1.31	1.33	1.35	1.37	1.39	1.41	1.43	1.45	1.47	1.49	1.51	1.53	1.54	1.56	1.9	
2.0	1.32	1.30	1.29	1.29	1.30	1.31	1.33	1.35	1.37	1.39	1.41	1.43	1.45	1.47	1.49	1.51	1.53	1.54	1.56	2.0					
2.1	1.39	1.37	1.37	1.38	1.39	1.41	1.43	1.45	1.47	1.50	1.52	1.54	1.56	1.58	1.59	1.61	1.63	1.65	2.1						
2.2	1.47	1.46	1.47	1.48	1.50	1.52	1.54	1.56	1.58	1.60	1.62	1.64	1.66	1.68	1.70	1.72	1.74	2.2							
2.3	1.55	1.56	1.57	1.58	1.60	1.63	1.65	1.67	1.69	1.71	1.73	1.76	1.78	1.80	1.82	1.83	2.3								
2.4	1.65	1.66	1.68	1.69	1.72	1.74	1.76	1.78	1.80	1.83	1.85	1.87	1.89	1.91	1.93	2.4									
2.5	1.76	1.77	1.79	1.81	1.83	1.86	1.88	1.90	1.92	1.95	1.97	1.99	2.01	2.02	2.5										

TABLE 3.—VOLUME (V_m) OF LIQUID MENISCUS, $\theta = 0$

(Meniscus concave upwards)

As quantities tabulated are dimensionless, any consistent system of units may be used. g = acceleration of gravity, r = radius of tube, h_c = length of tube of radius r and volume V_m . (Computed from tables of Bashforth and Adams as given in their "Capillary Action.")

$g\rho r^2/\gamma$	V_m/r^3	h_c/r	$g\rho r^2/\gamma$	V_m/r^3	h_c/r
0	1.048	0.333	4.0	0.649	0.206
0.1	1.029	0.327	4.5	0.623	0.198
0.2	1.010	0.321	5.0	0.599	0.190
0.4	0.978	0.311	5.5	0.578	0.184
0.6	0.947	0.301	6.0	0.557	0.177
0.8	0.919	0.292	6.5	0.537	0.171
1.0	0.894	0.284	7.0	0.518	0.165
1.5	0.837	0.266	7.5	0.501	0.159
2.0	0.789	0.251	8.0	0.484	0.1540
2.5	0.747	0.238	8.5	0.470	0.1493
3.0	0.711	0.226	9.0	0.456	0.1449
3.5	0.678	0.216	9.5	0.442	0.1406
			10.0	0.429	0.1365

Example 1 A gas is collected in a eudiometer over mercury. The volume to the plane through the line of contact of the mercury with the wall of the tube = V_o . If this portion of the eudiometer is a vertical, circular cylinder of diameter $d = 10$ mm, and if height of meniscus is $h_m = 1.5$ mm, then $V_m = 0.0723$ cm³ (Table 1), and the actual volume of the gas is $V = V_o - 0.072$ cm³.

If volumes are expressed in terms of a linear scale engraved upon the cylindrical portion of the eudiometer, and if the scale reading at the line of contact is h_o , and if $d = 10$ mm, $h_m = 1.5$ mm, then $h_c = 0.921$ mm (Table 2), and the actual volume of the gas corresponds to $h_o - h_c = h_o - 0.921$ mm.

Example 2 A gas is collected in a eudiometer over water. The volume to the plane tangent to the bottom of the meniscus = V_o . If this portion of the eudiometer is a vertical, circular cylinder of radius $r = 0.5$ cm, if $\gamma = 73$ dynes/cm, $g = 980.7$ cm/sec², $\rho = 1.000$, and $\theta = 0$ (the tube is perfectly wetted by the water), then $g\rho r^2/\gamma = 13.43$ cm⁻¹, $g\rho r^2/\gamma = 3.36$. Hence $V_m/r^3 = 0.689$ (Table 3), and $V_m = 0.086$ cm³. Hence the actual volume of the gas is $V_o - V_m = V_o - 0.086$ cm³.

If volumes are expressed in terms of a linear scale engraved upon the cylindrical portion of the eudiometer, and if the scale reading corresponding to the bottom of the meniscus is h_o , then for $g\rho r^2/\gamma = 3.36$, $h_c/r = 0.219$ (Table 3), and if $r = 5$ mm, $h_c = 1.10$ mm, and the actual volume of the gas corresponds to $h_o - h_c = h_o - 1.10$ mm.

WEIGHTS AND WEIGHING

A. T. PIENKOWSKY

In this section are considered:—(A) Weights—the basis upon which they are adjusted or tested, and their constancy; (B) the correcting of weighings for the buoyant effect of the air, including the weighing of substances in containers; and (C) the correcting of density determinations for the buoyant effect of the air.

WEIGHTS

Basis of Adjustment.—Most weights are adjusted by the maker according to their apparent weight in air against brass standards. This is equivalent to adjusting brass weights according to their real mass (or "weight in vacuo"), but the true mass values of other

weights (e.g., those of platinum, aluminum, or quartz) may be much different from their nominal values. When a set of weights is calibrated, however, the values found may be either true mass or apparent values, depending on the standard used and the method of conducting the test. Certificates from different standardizing laboratories may give values on either basis, or on both.

"Weight in Air against Brass."—Commercial weighing is all based on apparent weight in air against brass standards, this basis being more or less accurately defined in some countries. Precise scientific weighing is based on true mass values (i.e., on "weight in vacuo"), but weights below one gram may be tested and used as if they were of brass, even for work of rather high precision. In so testing these weights, their apparent "values" are computed on the assumption that their density is Δ_b —density of brass (generally Δ_b is taken as 8.4 g per cm^3); and in using them the apparent values so found are used as though they were the true masses of the weights, Δ_b being at the same time used just as though it were the true density of the weights. In such cases the error ($m_f - m$) so introduced, arises solely from the fact that the density (σ_1) of the air at the time the values of the weights were determined differs from that (σ) at the time they were used in weighing the object. This error is given approximately by equation (1) in which m is the correct, and m_f is the false mass, s is the nominal value of the weight, Δ_b is the density assumed for brass weights and Δ the actual density of the weights used.

$$m_f - m = s \left(\frac{1}{\Delta_b} - \frac{1}{\Delta} \right) (\sigma_1 - \sigma) \quad (1)$$

Example: If the value of a platinum 500 mg weight ($\Delta = 21.5 \text{ g/cm}^3$) is determined according to "weight in air against brass" ($\Delta_b = 8.4 \text{ g/cm}^3$) at sea level ($\sigma_1 = 0.0012 \text{ g/cm}^3$), and this value is used at an altitude of 5000 ft. ($\sigma = 0.0010 \text{ g/cm}^3$) the error in the mass of a body as so weighed will be $m_f - m = 0.007 \text{ mg}$.

"Apparent" densities or specific gravities determined according to apparent "weight in air against brass" are subject not merely to variations in the density of the air, but also to differences in experimental technique (see p. 78 to 80).

Constancy. Data on changes in weights can indicate only the order of magnitude of such changes, and as a rule can show only what *may* happen, since such changes are extremely irregular.

Ordinary brass weights with knobs screwed in (whether gold plated, platinum plated, or lacquered) may continue to gain in weight for many years, and may do so without developing any visible signs of such change. The following examples are typical of extreme changes that sometimes occur. Larger changes have been recorded.

Denomination	g	100	50	20	10	5	2	1
Gain in 6 yr	mg	1.7	1.2	0.8	0.7	0.6	0.8	0.3
Gain in 14 yr	mg	3.3	3.9	1.8	2.5	0.8	0.3	1.1

The following is typical of what has often happened when new weights were not used and were carefully protected.

Denomination	g	100	50	20	10	5	2	1
Gain in 5 mo	mg	0.1	0.1	0.0	0.1	0.1	0.0	0.0
Gain in 1 yr	mg	0.2	0.1	0.0	0.0	0.1	0.0	0.0

Lacquered weights of good quality are less subject to spotting and general surface tarnishing than are the gold or platinum plated weights often sold. Lacquered weights, however, are subject to rapid variations caused by changes in the relative humidity of the air. Lacquered weights of about 20 to 100 g may be expected to vary 0.1 or 0.2 mg with large variations in humidity. Changes of over 0.5 mg have been recorded.

Sets of weights of the ordinary type may, however, be very constant. For example, one set was used for over a year with changes less than 0.02 mg and few changes over half that amount; and two sets were used occasionally for 17 and 18 yr, respectively, with no changes over 0.2 mg.

For reference standards, one-piece weights are very much more reliable than the common screw-knob type. The following changes in a high grade, gold plated, bronze set of this type are typical for weights used little and with great care. Positive changes are gains, negative changes losses.

Denomination	g	50	20	10	5	2	1
Changes in 15 yr	mg	-0.12	0.00	-0.01	-0.006	0.0010	0.008

Solid platinum or platinum-iridium weights of moderate size may be expected to remain constant within about 0.01 mg if handled with sufficient care and protected from dust and other deposits. The sheet metal weights below one g are not much more constant than this; very good weights kept with extreme care as reference standards may stay within 0.001 mg for some years, but this cannot safely be assumed. If these small weights are much used, even with good care, losses of 0.01 mg may soon be expected in the larger ones.

CORRECTING OF WEIGHINGS FOR BUOYANT EFFECT OF THE AIR

("Reduction of Weighings to Vacuo")

In addition to a sufficiently sensitive balance, accurate weighing requires (1) that the balance itself maintain a sufficiently constant zero point and ratio of arms of the beam; (2) that the effect of inequality of the arms of the beam be eliminated by the method of weighing, since it cannot as a rule be corrected for with sufficient accuracy; (3) that the object and the weights have definite constant values, free from such effects as variable surface evaporation, magnetic attractions, etc.; (4) that surrounding conditions be maintained free from sources of disturbance and error, such as electrostatic attractions, convection currents, variable or unsymmetrical heat radiations, etc.; and (5) that proper correction be made for the buoyant effect of the air.

The first four types of requirements are matters of technique, and no general methods of correction can be used for errors arising from them. They are therefore outside the scope of these tables.

The fifth requirement demands definite formulae and facts, some of the most fundamental or general of which are given below.

The phrase "apparent weight" is commonly used for the result of a weighing in which no correction has been made for the buoyant effect of the air. The phrase is ambiguous¹ and often leads to a confusion of ideas. Therefore this term is not used in the equations of this section, but reference is made directly to the weights that would be used on an equal-arm balance to make the weighings. The phrase "weights needed" must be understood to include the proper fraction of the rider or other small weights needed to make up the total amount; and it refers to *actual* values of the weights, which may or may not equal the nominal values marked on them.

Symbols —

- a* mass of the contents of the "empty" portions of the container.
(In weighing gases *a* is zero. In weighing solids or liquids it may be the mass of air or of vapor of the solid or liquid. In weighing a pyknometer with the liquid which fills it at a temperature different from that at which it is weighed, the volume occupied by *a* results from the unequal expansion of pyknometer and liquid)
- b* $(v_s - v_r)/v_s$. Relative size of the container and its counterpoise
- c* mass of counterpoise
- k* buoyancy reduction factor
- l* mass of liquid that fills the pyknometer at the established filling temperature
- m* mass of object; in general or where its volume is not fixed by the volume of a pyknometer
- p* mass of pyknometer or other container
- r* error resulting from use of approximate buoyancy formula

¹ Compare equations (8) and (9); in each case $s'' - s'$ would be called the apparent weight, but its value in (9) is v_{air} greater than in (8).

- s mass of weights needed on an equal arm balance, whether with or without special counterpoise, to balance the objects being weighed. (Regarding use of other than true mass values, see p. 73)
- $s, s - v_s\sigma = s(1 - \sigma/\Delta)$. This is not "weight in vacuo" as that phrase is often used
- t temperature. If accented it is the temperature at the time of the indicated weighing; if unaccented, it is the temperature at which the pycnometer is filled. In so far as their temperatures have any effect upon the operation considered, all objects (e.g., the balance, its loads, and the surrounding air) are assumed to be at the same temperature
- v volume or capacity; when without subscript it is capacity of the container at time of weighing; with one of the subscripts a, c, l, m, p, s , or w , it is volume of the object whose mass is indicated by the subscript (e.g., v_m = volume of the object whose mass is m)
- v_t capacity of the pycnometer at the temperature of filling
- v_p volume of the pycnometer itself, excluding the space that would be filled by liquid at the temperature of filling. (Ordinarily v_p = volume of the material of which the pycnometer is constructed)
- v_a "exterior volume" of the pycnometer or other container. With pycnometers, at temperature of filling, $v_a = v_p + v_t$; at another temperature, $v'_a, v'_p, v'_t + v'' = v_p'' + v_w'' + v_a''$
- w mass of the calibrating liquid (e.g., water) which is used to determine a volume or to serve as a standard of density
- β cubical coefficient of thermal expansion
- Δ density of the weights at the time of weighing
- σ density of the air at the time of weighing
- ρ density of object being studied or of calibrating liquid. If accented it is density at time of weighing; if unaccented it is density at temperature (t) at which the pycnometer was filled

Density is true mass per unit of volume.

Accents denote the weighing to which the quantity applies. In general ' denotes the weighing of the object alone or of the container; '' denotes the weighing of the combined container and object studied, or of the container filled with the calibrating liquid or of the object suspended in the calibrating liquid; ''' denotes the weighing of the pycnometer "filled" with liquid to be studied, or "filled" with object studied plus calibrating liquid.

Subscripts.— f denotes false or erroneous values. For, see above (s and v_c). Other subscripts indicate the object to which the quantity applies; e.g., ρ_a = density of material whose mass is a .

Fundamental Exact Equation.—The use of the direct, fundamental, exact equation (2) avoids many complications and approximations introduced by most formulae based on densities.

$$m = s + (v_m - v_s)\sigma \quad (2)$$

The equation using densities, in one of the exact forms (3) given below, is useful chiefly for computing exact tables, or the effect of errors, approximations, etc. As a rule, either the densities are not known well enough to warrant its use, or the volumes involved will have been measured, thus going back to equation (2).

$$m = s \left(\frac{1 - \frac{\sigma}{\Delta}}{1 - \frac{\sigma}{\rho_m}} \right) = s \frac{\rho_m(\Delta - \sigma)}{\Delta(\rho_m - \sigma)} = s \left\{ 1 + \frac{\sigma(\Delta - \rho_m)}{\Delta(\rho_m - \sigma)} \right\} = s + s \frac{\sigma(\Delta - \rho_m)}{\Delta(\rho_m - \sigma)} \quad (3)$$

In the last form of (3), the second term is the exact "buoyancy correction term," and in this correction term the factor (fraction) by which s is multiplied is the exact "buoyancy reduction factor" (k). See Tables 2 and 3.

Common Equation Using Densities.—Some form of equation (4) is commonly used for reducing weighings. This equation is not exact. It is entirely inapplicable to weighing gases, but is amply accurate for much work with solids and liquids.

$$m = s + s\sigma \left(\frac{1}{\rho_m} - \frac{1}{\Delta} \right) \quad (4)$$

The factor $\sigma \left(\frac{1}{\rho_m} - \frac{1}{\Delta} \right)$ is the "buoyancy reduction factor" commonly given. When the densities lie between 0.5 and 21.5 g per cm³, and are known with sufficient accuracy, the error (r) introduced by the use of this formula does not exceed one part in 100 000 of the mass of the object weighed. Its value, and that of the proportional error ($r' = r/s$) may be calculated by formula (5); their orders of magnitude may readily be determined from Table 1, which is based on $\sigma = 0.0012$ g/cm³.

$$r' = \frac{r}{s} = \frac{\sigma^2(\Delta - \rho_m)}{\Delta\rho_m(\rho_m - \sigma)} \quad (5)$$

TABLE 1
Unit of Density is g/cm³

ρ_m	100 r'		
	$\Delta = 21.5$	$\Delta = 8.4$	$\Delta = 2.05$
1.00	0.0001	0.0001	0.0001
0.5	0.0006	0.0005	0.0005
0.05	0.06	0.06	0.06
0.005	8	8	7

Density of the Air.—Variations in the density of the air under standard conditions,¹ as well as the uncertainties of its experimental determination, limit the precision with which very large or extremely precise buoyancy corrections can be calculated from tables of air density. The former seems at present to be the larger, and therefore sets a fixed limit which can be exceeded only by eliminating or reducing the size of the correction, or by making an experimental determination of the density of the air at the time of the weighing. These limiting uncertainties are of the order of 5 in 10⁴ and affect the total buoyancy correction in the same ratio. Since they affect only the fourth significant figure in the buoyancy reduction factor they are negligible in the use of Tables 2 and 3.

In weighing gases, the density of the air must be found from precise tables (consult index). When the volume of the gas is not compensated by a counterpoise of the same size, the density of the air must be known with approximately the same precision as is desired for that of the gas; when it is so compensated, the buoyancy correction is generally the total buoyancy on the weights, and therefore is still relatively large.

For most work with solids and liquids an approximate value of the density of the air is sufficient. The precision to which it must be known can be found from an examination of Table 2. It should be noted that a precision of 1 in 10⁴ in the mass to be determined requires a precision of 1 in the n th decimal place of the buoyancy reduction factor (r or, in the actual factor k , not in the printed value of 10000). In getting the buoyancy reduction factor from Table 2, and in similar work, to a precision not greater than one in about 10⁴, the density of the air may be found from the "Air Density Chart," Fig. 1.

The precision to which temperature, pressure, and humidity must be known in order to find the density of the air to the necessary precision, may be inferred from Fig. 1, except in the case of very large corrections, or of corrections to be determined with extreme precision. In the latter cases this information must be sought in other places.

Density of the Weights.—If the density of the air in which the weights are used is the same as that in which their values were determined, errors in the density assumed for the weights will have

¹ Treuthart, 34, 173: 1598, 21. Molen, 34, 173: 1600, 21.

no effect on the accuracy with which the mass of the object may be determined, provided the same density that was assumed for them in determining their values is assumed for them when they are used. It is not necessary, therefore, to know the density of the weights as accurately as that of the object weighed.

If weights are used in air whose density differs by not more than 20% from that of the air in which their values were determined, the amount by which the density of ordinary weights is likely to differ from the values used in Tables 2 and 3 will not cause errors greater than one part in about 100,000 in the determination of the mass of the object weighed; provided that the density used in determining the value of the weight is the same as that used in the computation of the mass.

For a precision above one part in a million, it is frequently necessary to measure the volume or density of each weight.

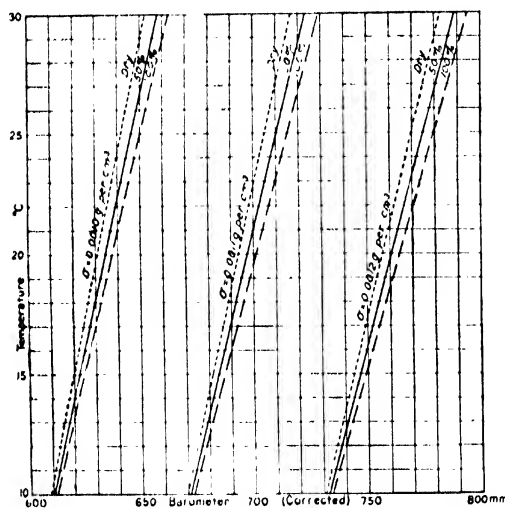


FIG. 1.—Air density chart (For use with Tables 2 and 3.)

Ordinary two-piece weights are not used for such work because they cannot safely be put into liquids for hydrostatic weighing.

Aluminum is not used for weights above 0.02 g in high quality weights, nor above 0.5 g in second quality sets. When the values of such weights have been determined on the assumption of a density of 2.7 g per cm³ at 0°C, the use of the buoyancy reduction factors given for quartz in Table 2 introduces an error in the mass of the object weighed, of less than 0.0002 mg for amounts up to 0.02 g, and of less than 0.005 mg for amounts up to 0.5 g.

The densities of most gold alloys used for weights lie between 16 and 18 g per cm³. For gold within this range, the use of the factors given in Tables 2 and 3 will not introduce errors greater than one part in 200,000, or not over 0.005 mg in weighing amounts under one g.

In Tables 2 and 3, the densities used for weights of platinum or platinum-iridium, for those of brass or bronze, and for those of aluminum, are those which were adopted many years ago for certifying weights at the National Bureau of Standards of the United States of America, and were assumed as the densities at 0°C. The following coefficients of cubical expansion are assumed in reducing the volumes of such weights to the volumes at 20°C.

Platinum and Platinum-iridium	0.000 026 per deg. C
Brass or bronze	0.000 054 per deg. C
Aluminum	0.000 069 per deg. C

The densities of gold and of crystal quartz are assumed as the densities at 20°C. All buoyancy reduction factors are based on differences in volume at 20°C.

Density of Object Weighed.—A change of one in 10ⁿ of the mass of the object corresponds to a change of one in the nth decimal place of the buoyancy reduction factor. Therefore, to the precision obtainable by the use of Table 2, the precision required in the density of the object may be found by noting in that table what change in density (at approximately the density under consideration) corresponds to the allowable variation in the buoyancy reduction factor.

The use of "standard" or "adopted" densities for the object weighed may give an accuracy which is entirely fictitious. There is no compensation as in the case of weights, and the actual error or uncertainty in the density of the particular object weighed has its full effect in the error or uncertainty of the calculated mass.

A fictitious "apparent" density derived from weighings uncorrected for buoyancy of the air must be corrected to true density before being inserted in the formulae given in this section unless only an approximate value of density is needed (see p. 78).

Temperature of Objects and Weights.—In weighing gases, and to secure the highest precision in many other cases, it is necessary to compute all volumes or densities at the actual temperature of the observations, unless the coefficient of expansion of the object happens to be nearly the same as that of the weights. If the temperature is entirely neglected, and weighings are made at room temperatures, the extreme error likely to be introduced in the mass calculated for solids and liquids is less than three in 10⁴. (This would be the error for material having a density of 0.2 g per cm³ at 0°C, and a coefficient of cubical expansion of 1.6 × 10³, when compared with weights whose actual volumes or densities are those used in the calculation.)

Example 1: The actual mass of the weights used was $s = 10.0105$ g; the corrected barometric height was 758 mm; air temperature, 19.6°C; relative humidity 25%; density of object 3.5 g/cm³; weights were of brass.

Referring to Fig. 1, the air density corresponding to these conditions is seen to be close to 0.0012 g/cm³. Entering Table 2 with $\rho_m = 3.5$ and the column for brass weights, under $1000\sigma = 1.2$, it is found that $1000k$ is 0.20; hence the mass of the object is $m = s + ks = 10.0105 + 0.00020 \times 10.0105 = 10.0105 + 0.0020 = 10.0125$ g.

Example 2: The factor for $\rho_m = 3.0$ differs by 6 in the fifth decimal place from that for $\rho_m = 3.5$. The error in mass produced by using 3.0 in place of 3.5 as the density of the object is therefore 6 parts in 10⁵. For the object in Example 1 this would be an error of 0.000 6 g. Similarly the use of 7.0 instead of 7.5 for ρ_m would produce an error of about one part in 10⁴ in the mass of the object.

Example 3: In Fig. 1 the point corresponding to barometric height 720 mm, air temperature 21°C, and relative humidity 50%, lies to the right of the line for 0.0011 g/cm³, 50%, by $\frac{1}{2}$ of the distance between the 0.0011 and the 0.0012 lines. Hence, $\sigma = 0.0011 + 0.0001 \times \frac{1}{2} = 0.00115$ g/cm³. (For most work for which Table 2 is suited the density can be estimated by eye with sufficient accuracy; as in this case, 0.00113 g/cm³.) The factor from Table 2 may then be found either by multiplying the factor for $1000\sigma = 1.0$ by 1.13 or by interpolating between the factor for $1000\sigma = 1.1$ and that for $1000\sigma = 1.2$. For brass weights and $\rho_m = 3.5$ the former gives $0.17 \times 1.13 = 0.192$ as the value of $1000k$. A calculated interpolation between 0.18 and 0.20 gives 0.186, which agrees with the other value within the accuracy of such tabular interpolations.

Weighing Objects in Containers.—Two weighings are required; one of the container alone and the other with the object in the

TABLE 2.—BUOYANCY REDUCTION FACTOR (k)

$$m = s + ks, \text{ where } k = \frac{\sigma(\Delta - \rho_m)}{\Delta(\rho_m - \sigma)}$$

(cf equation (3). Symbols, p. 74.) Unit of density is g/cm³ or, to precision of this table, g/ml

Density of object weighed ρ_m	$\Delta = 21.5$ Pt or Pt-Ir			$\Delta = 17$ Gold			$\Delta = 8.4$ Brass or bronze			$\Delta = 2.65$ Crystal quartz or aluminum*		
	1000 $\sigma =$			1000 $\sigma =$			1000 $\sigma =$			1000 $\sigma =$		
	1.0	1.1	1.2	1.0	1.1	1.2	1.0	1.1	1.2	1.0	1.1	1.2
0.2	4.98	5.48	5.98	4.97	5.47	5.97	4.91	5.40	5.89	4.65	5.11	5.58
0.3	3.30	3.63	3.96	3.29	3.62	3.95	3.22	3.55	3.87	2.97	3.26	3.56
0.4	2.46	2.71	2.95	2.45	2.69	2.94	2.39	2.63	2.87	2.13	2.34	2.55
0.5	1.96	2.15	2.35	1.95	2.14	2.34	1.88	2.07	2.26	1.63	1.79	1.95
0.6	1.62	1.79	1.95	1.61	1.77	1.93	1.55	1.71	1.86	1.29	1.42	1.55
0.7	1.38	1.52	1.66	1.37	1.51	1.65	1.31	1.44	1.57	1.05	1.16	1.26
0.75	1.29	1.42	1.55	1.28	1.40	1.53	1.22	1.34	1.46	0.96	1.05	1.15
0.80	1.20	1.33	1.45	1.19	1.31	1.43	1.13	1.25	1.36	0.87	0.96	1.05
0.82	1.17	1.29	1.41	1.16	1.28	1.39	1.10	1.21	1.32	0.84	0.93	1.01
0.84	1.15	1.26	1.37	1.13	1.25	1.36	1.07	1.18	1.29	0.81	0.90	0.98
0.86	1.12	1.23	1.34	1.11	1.22	1.33	1.04	1.15	1.25	0.79	0.86	0.94
0.88	1.09	1.20	1.31	1.08	1.19	1.29	1.02	1.12	1.22	0.76	0.84	0.91
0.90	1.07	1.17	1.28	1.05	1.16	1.26	0.99	1.09	1.19	0.73	0.81	0.88
0.91	1.05	1.16	1.26	1.04	1.15	1.25	0.98	1.08	1.18	0.72	0.79	0.87
0.92	1.04	1.15	1.25	1.03	1.13	1.24	0.97	1.06	1.16	0.71	0.78	0.85
0.93	1.03	1.13	1.24	1.02	1.12	1.22	0.96	1.05	1.15	0.70	0.77	0.84
0.94	1.02	1.12	1.22	1.01	1.11	1.21	0.95	1.04	1.13	0.69	0.76	0.82
0.95	1.01	1.11	1.21	0.99	1.09	1.19	0.93	1.03	1.12	0.68	0.74	0.81
0.96	1.00	1.10	1.20	0.98	1.08	1.18	0.92	1.02	1.11	0.67	0.73	0.80
0.97	0.99	1.08	1.18	0.97	1.07	1.17	0.91	1.00	1.09	0.65	0.72	0.79
0.98	0.97	1.07	1.17	0.96	1.06	1.16	0.90	0.99	1.08	0.64	0.71	0.77
0.99	0.96	1.06	1.16	0.95	1.05	1.14	0.89	0.98	1.07	0.63	0.70	0.76
1.00	0.95	1.05	1.15	0.94	1.04	1.13	0.88	0.97	1.06	0.62	0.69	0.75
1.01	0.94	1.04	1.13	0.93	1.03	1.12	0.87	0.96	1.05	0.61	0.67	0.74
1.02	0.93	1.03	1.12	0.92	1.01	1.11	0.86	0.95	1.03	0.60	0.66	0.72
1.03	0.93	1.02	1.11	0.91	1.00	1.10	0.85	0.94	1.02	0.59	0.65	0.71
1.04	0.92	1.01	1.10	0.90	0.99	1.08	0.84	0.93	1.01	0.58	0.64	0.70
1.05	0.91	1.00	1.09	0.89	0.98	1.07	0.83	0.92	1.00	0.58	0.63	0.69
1.06	0.90	0.99	1.08	0.89	0.97	1.06	0.82	0.91	0.99	0.57	0.62	0.68
1.07	0.89	0.98	1.07	0.88	0.96	1.05	0.82	0.90	0.98	0.56	0.61	0.67
1.08	0.88	0.97	1.06	0.87	0.95	1.04	0.81	0.89	0.97	0.55	0.60	0.66
1.09	0.87	0.96	1.05	0.86	0.94	1.03	0.80	0.88	0.96	0.54	0.59	0.65
1.10	0.86	0.95	1.04	0.85	0.94	1.02	0.79	0.87	0.95	0.53	0.58	0.64
1.12	0.85	0.93	1.02	0.83	0.92	1.00	0.77	0.85	0.93	0.52	0.57	0.62
1.14	0.83	0.91	1.00	0.82	0.90	0.98	0.76	0.83	0.91	0.50	0.55	0.60
1.16	0.82	0.90	0.98	0.80	0.88	0.96	0.74	0.82	0.89	0.49	0.53	0.58
1.18	0.80	0.88	0.96	0.79	0.87	0.95	0.73	0.80	0.87	0.47	0.52	0.56
1.20	0.79	0.87	0.95	0.78	0.85	0.93	0.71	0.79	0.86	0.46	0.50	0.55
1.25	0.75	0.83	0.91	0.74	0.82	0.89	0.68	0.75	0.82	0.42	0.47	0.51
1.30	0.72	0.80	0.87	0.71	0.78	0.85	0.65	0.72	0.79	0.39	0.43	0.47
1.35	0.69	0.76	0.83	0.68	0.75	0.82	0.62	0.68	0.75	0.36	0.40	0.44
1.40	0.67	0.74	0.80	0.66	0.72	0.79	0.60	0.66	0.71	0.34	0.37	0.40
1.50	0.62	0.68	0.74	0.61	0.67	0.73	0.55	0.60	0.66	0.29	0.32	0.35
1.6	0.58	0.64	0.69	0.57	0.62	0.68	0.51	0.56	0.61	0.25	0.27	0.30
1.7	0.54	0.60	0.65	0.53	0.58	0.64	0.47	0.52	0.56	0.21	0.23	0.25
1.8	0.51	0.56	0.61	0.50	0.55	0.60	0.44	0.48	0.52	0.18	0.20	0.21
1.9	0.48	0.53	0.58	0.47	0.51	0.56	0.41	0.45	0.49	0.15	0.16	0.18
2.0	0.45	0.50	0.54	0.44	0.49	0.53	0.38	0.42	0.46	0.12	0.14	0.15
2.2	0.41	0.45	0.49	0.40	0.44	0.48	0.34	0.37	0.40	0.08	0.08	0.09
2.4	0.37	0.41	0.44	0.36	0.39	0.43	0.30	0.33	0.36	0.04	0.04	0.05
2.6	0.34	0.37	0.41	0.33	0.36	0.39	0.27	0.29	0.32	0.01	0.01	0.01
2.8	0.31	0.34	0.37	0.30	0.33	0.36	0.24	0.26	0.29	-0.02	-0.02	-0.02
3.0	0.29	0.32	0.34	0.27	0.30	0.33	0.21	0.24	0.26	-0.04	-0.05	-0.05
3.5	0.24	0.26	0.29	0.23	0.25	0.27	0.17	0.18	0.20	-0.09	-0.10	-0.11
4	0.20	0.22	0.24	0.19	0.21	0.23	0.13	0.14	0.16	-0.13	-0.14	-0.15
5	0.15	0.17	0.18	0.14	0.16	0.17	0.08	0.09	0.10	-0.18	-0.20	-0.21
6	0.12	0.13	0.14	0.11	0.12	0.13	0.05	0.05	0.06	-0.21	-0.23	-0.25
7	0.10	0.11	0.12	0.08	0.09	0.10	0.02	0.03	0.03	-0.23	-0.26	-0.28
8	0.08	0.09	0.09	0.07	0.07	0.08	0.01	0.01	0.01	-0.25	-0.28	-0.30
9	0.06	0.07	0.08	0.05	0.06	0.06	-0.01	-0.01	-0.01	-0.27	-0.29	-0.32
10	0.05	0.06	0.06	0.04	0.05	0.05	-0.02	-0.02	-0.02	-0.28	-0.31	-0.33
12	0.04	0.04	0.04	0.02	0.03	0.03	-0.04	-0.04	-0.04	-0.29	-0.32	-0.35
14	0.02	0.03	0.03	0.01	0.01	0.02	-0.05	-0.05	-0.06	-0.31	-0.34	-0.37
16	0.02	0.02	0.02	0.00	0.00	0.00	-0.06	-0.06	-0.07	-0.31	-0.35	-0.38
18	0.01	0.01	0.01	0.00	0.00	0.00	-0.06	-0.07	-0.08	-0.32	-0.35	-0.39
20	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.07	-0.08	-0.08	-0.33	-0.36	-0.39
22	0.00	0.00	0.00	-0.01	-0.01	-0.02	-0.07	-0.08	-0.09	-0.33	-0.37	-0.40

* See Density of Weights, p. 75

container. The exact equations connecting the masses and corresponding to equation (2) are:

$$(p' + a') = (s' + c') + [v_s' - (v_s' + v_c')] \sigma'$$

and

$$(p'' + m + a'') = (s'' + c'') + [v_s'' - (v_s'' + v_c'')] \sigma''$$

Assuming p and c to be constant, as must generally be done, and subtracting, gives the general equation (6).

$$m = (s'' - s') - (a'' - a') + [v_s'' - (v_s'' + v_c'')] \sigma'' - [v_s' - (v_s' + v_c')] \sigma' \quad (8)$$

If also v_s , v_c , Δ and σ are the same for both weighings, which requires the same temperature and equivalent atmospheric conditions,

$$m = (s'' - s') - (a'' - a') - (v_s'' - v_s') \sigma \quad (7)$$

TABLE 3.—BUOYANCY REDUCTION FACTOR (k) FOR USE IN INTERCOMPARISON OF WEIGHTS
(For other factors and for symbols, see Table 2 and p. 74)

Density of weight tested ρ_m	1000k														
	$\Delta^* = 21.5$ Pt or Pt-Ir			$\Delta^\dagger = 17$ Gold			$\Delta^* = 8.4$ Brass or bronze			$\Delta^* = 2.7$ Aluminum			$\Delta^\dagger = 2.65$ Crystal quartz		
	1000 σ =			1000 σ =			1000 σ =			1000 σ =			1000 σ =		
	1 0	1 1	1 2	1 0	1 1	1 2	1 0	1 1	1 2	1 0	1 1	1 2	1 0	1 1	1 2
21.5*	0.000	0.000	0.000	-0.012	-0.014	-0.015	-0.073	-0.080	-0.087	-0.324	-0.357	-0.389	-0.331	-0.364	-0.397
17†	0.012	0.014	0.015	0.000	0.000	0.000	-0.060	-0.066	-0.072	-0.312	-0.343	-0.374	-0.319	-0.350	-0.382
8.4*	0.073	0.080	0.087	+0.000	+0.066	+0.072	0.000	0.000	0.000	-0.252	-0.277	-0.302	-0.258	-0.284	-0.310
2.7*	0.324	0.357	0.389	0.312	0.343	0.375	+0.252	+0.277	+0.302	0.000	0.000	0.000	-0.006	-0.007	-0.008
2.65†	0.331	0.364	0.397	0.319	0.351	0.382	0.258	0.284	0.310	+0.006	+0.007	+0.008	0.000	0.000	0.000

* Density at 0°C, see "Density of Weights," p. 75

† Density at 20°C, see "Density of Weights," p. 75

If also $\rho_a'' = \rho_a' = \sigma$, as when the "empty" portion of the container is filled with air of the same density as the surrounding atmosphere, and the vapor of the "object" weighed is negligible or should be included in m ,

$$m = (s'' - s') + (v_m - v_{a''-s})\sigma \quad (8)$$

or

$$m = (s'' - s') \left(1 - \frac{\sigma}{\rho_m}\right) + v_m \sigma = (s'' - s') \left(1 - \frac{\sigma}{\rho_m}\right) \quad (8')$$

In equations (8) and (8') the effect of the container has been eliminated; the equation is of the form of equation (2), and the buoyancy reduction factor from Table 2 may be used.

If the container is exhausted¹ when weighed alone; and if, when the object is being weighed there is in the container only material whose mass should be part of m , then $a' = a'' = 0$ and instead of equations (8) and (8') we have

$$m = (s'' - s') - v_{a''-s} \sigma = (s'' - s') \left(1 - \frac{\sigma}{\Delta}\right) \quad (9)$$

In this case the buoyant effect of the air on the object weighed has been eliminated, and the ordinary buoyancy reduction factors or equations do not apply (cf. (2) and (3)); Table 2 can not be used.

CORRECTING DENSITY DETERMINATIONS FOR THE BUOYANT EFFECT OF THE AIR

Correcting "Apparent" Values.—Radical differences in the constancy of temperatures or air densities, or such differences as that between equations (8) and (9) above, make it impossible to develop any single correction formula for correcting what are often called "apparent" values of specific gravity, or of density—values which have been determined without proper correction for the buoyant effect of the air. Such values can, however, be corrected in so far as the method and conditions of their determination are known.

Limitations.—In general: (1) It is impossible to correct each weighing on which the determination depends, because some unknown mass, volume, or density will generally be needed in order to find the volume of the air displaced. In some cases, however, approximate values may be known with sufficient accuracy for this purpose.

(2) Some special experimental requirements are always involved. Among these may be equal temperatures for two operations, constant volumes (e.g., of pycnometer), negligible changes in the density of the air, etc., or a combination of several of them. A variety of combinations of such requirements may be used, each

¹ As v_a is assumed to remain constant, pressure effects must be suitably eliminated.

having its peculiar advantages, and each leading to a different equation.

(3) If the number of experimental requirements is made very small, the resulting equation for true density is very complex. Simplification of the final solution can be accomplished only by increasing the experimental requirements or by introducing approximations into the solution.

No method can be selected as "best."¹ Hence, the material given here is limited to the general fundamental equations, and to the exact solutions for certain cases that are of wide applicability in work of moderate precision. From these it is possible to arrange procedures suited to many different conditions, and to determine the accuracy of the corresponding solutions, and the effects of different errors under various circumstances.

In every case, ρ_m is obtained in the same units as those in which ρ_w is expressed. For the purposes of the following equations, σ may, in general, be expressed either as g/cm³ or as g/ml.

Density of Gases.—The general equations for weighing gases are the same as those for pycnometer determinations of liquids, particularly those for cases in which the pycnometer is exhausted when weighed alone, as in equation (17).

Experimental Requirements.—All the following equations involve two general requirements: (1) That in any one weighing or other operation all objects involved are at the same temperature (in weighing, the temperature of the atmosphere is involved); and (2) that changes in pressure produce no change in any of the volumes; e.g., the volume of the pycnometer or other container must not change when it is exhausted. In addition, each equation involves one or more of the following special requirements:

A. Mass of pycnometer and its counterpoise remains constant: $p' = p'' = p'''$ and $c' = c'' = c'''$.

B. Coefficient of expansion of counterpoise is the same as that of the pycnometer: $\beta_p = \beta_c$. This makes b the same for all weighings.

C. Temperature at which pycnometer is filled is the same for the material being studied as for the calibrating liquid. Therefore $w'' = \rho_w v_l$ and $l''' = \rho_l v_l$.

D. Temperature for all three weighings is the same as that at which the pycnometer is filled. This results in all volumes being constant, in $v_w'' = v_l''' = v'' = v'''$, in $a' = a''' = 0$, and in the density of each material being constant.

E. Density of the atmosphere the same for all three weighings: $\sigma' = \sigma'' = \sigma'''$.

F. Density of the weights the same in all weighings. This demands that the temperature be the same for all three weighings. See also p. 75.

¹ The advantages and disadvantages of different experimental arrangements, such as the size and mass of the counterpoise used, or the temperature control, do not depend on the form of solution of the equations so much as on the effect of variations and errors that are not shown in the fundamental equations.

G. Density of air or other material in the "empty" portion of the pyknometer equal to that of the surrounding atmosphere: $\rho_a' = \rho_a'' = \rho_a''' = \rho_a''''$.

H. Pyknometer evacuated when weighed empty.

I. Volume of counterpoise equal to "exterior" volume of pyknometer. $v_a = v_s$.

J. Volume of counterpoise equals that of the pyknometer itself, excluding the space that would be filled by liquid at the temperature of filling: $v_a = v_p$.

Pyknometer Determinations.—(1) *Liquids*.—Three weighings are required, from which, under experimental requirement A, w'' and l''' are obtained directly by equation (6). Under requirement C, $\rho_i = \frac{l'''}{w''} \rho_w$.

Therefore under requirements A and C:

$$\rho_i = \frac{(s''' - s') - (a''' - a') + [v_s''' - (v_s''' + v_s'')] \sigma''' - [v_s' - (v_s' + v_s'')] \sigma'}{(s'' - s') - (a'' - a') + [v_s'' - (v_s'' + v_s')] \sigma'' - [v_s' - (v_s' + v_s')] \sigma'} \rho_w \quad (10)$$

and

$$v_i = \frac{(s''' - s') - (a''' - a') + [v_s''' - (v_s''' + v_s'')] \sigma''' - [v_s' - (v_s' + v_s')] \sigma'}{\rho_w} \quad (11)$$

Under requirement B, b may be introduced for $\frac{v_s'' - v_s'}{v_s}$. If also a part of the buoyancy correction for each weighing is made by calculating s_s' , s_s'' , and s_s''' , then the remaining buoyancy reduction terms can be combined and simplified. Then under requirements A, B, and C the equations may be put in the form

$$\rho_i = \frac{s_s''' - s_s'}{s_s'' - s_s'} \left[\rho_w + \frac{a''' - a'}{v_i} - \frac{b(v_s''' \sigma''' - v_s' \sigma')}{v_i} \right] - \frac{a''' - a'}{v_i} + \frac{b(v_s''' \sigma''' - v_s' \sigma')}{v_i} \quad (12)$$

and

$$v_i = \frac{(s_s''' - s_s') - (a''' - a') + b(v_s''' \sigma''' - v_s' \sigma')}{\rho_w} \quad (13)$$

Under the conditions noted, these equations are perfectly general. They do not involve any mathematical approximations in their derivation and therefore show the proper effect of each quantity. However, in using them, approximate data must, in general, be used, because v_s which is needed in computing v_i cannot be accurately known until after v_i has been computed. If a first approximation is not sufficiently accurate the accuracy may be increased by successive approximations.

[The values of v_s' , v_s'' and v_s''' may be computed from the relation $v_s = v_p + v_i = \frac{P}{\rho_p} + \frac{w}{\rho_w}$ and if the capacity depends solely on temperature (and not on pressure or other factors), $v_s' = v_s[1 + \beta_p(l' - t)]$; $v_s'' = v_s[1 + \beta_p(l'' - t)]$; $v_s''' = v_s[1 + \beta_p(l''' - t)]$]

The values of a' , a'' , and a''' may be computed from known values of ρ_a and the equations

$$\left. \begin{aligned} v_a' &= v' = v_i[1 + \beta_p(l' - t)] \\ v_a'' &= v'' = v_i(\beta_p - \beta_w)(l'' - t) \\ v_a''' &= v''' = v_i(\beta_p - \beta_i)(l''' - t) \end{aligned} \right\} \quad (15)$$

Under requirements D, E, F, and G, in addition to A, B, and C, (12) becomes

$$\rho_i = \frac{s''' - s'}{s'' - s'} (\rho_w - \sigma) + \sigma \quad (16)$$

And under requirement H in addition to A, B, C, D, E, F, and G

$$\rho_i = \frac{s''' - s'}{s'' - s'} \rho_w \quad (17)$$

As shown in equations (16) and (17), experimental requirements A to G inclusive render the results independent of the size or nature of the counterpoise and of the value of the density of the weights used, though these quantities must be the same for all observations. Including requirement H renders the results independent of the

actual value of the density of the air also, but still requires that this value shall be the same for all three weighings.

Under requirement I, with A, B, and C, (10) becomes

$$\rho_i = \frac{(s_s''' - s_s') - (a''' - a')}{(s_s'' - s_s') - (a'' - a')} \rho_w \quad (18)$$

and its equivalent (12), and (13) become

$$\rho_i = \frac{s_s''' - s_s'}{s_s'' - s_s'} \left[\rho_w + \frac{a''' - a'}{v_i} \right] - \frac{a''' - a'}{v_i} \quad (19)$$

and

$$v_i = \frac{(s_s''' - s_s') - (a''' - a')}{\rho_w} \quad (20)$$

Under requirement J, with A, B, and C, (10) becomes

$$= \frac{(s''' - s') - (a''' - a') + [v_s''' - v_s'''] \sigma''' - [v_s' - v_s'] \sigma'}{(s'' - s') - (a'' - a') + [v_s'' - v_s''] \sigma'' - [v_s' - v_s'] \sigma'} \rho_w \quad (21)$$

and its equivalent (12), and (13) become

$$\rho_i = \frac{s_s''' - s_s'}{s_s'' - s_s'} \left[\rho_w + \frac{a''' - a'}{v_i} - \frac{1}{v_i} (v_s''' \sigma''' - v_s' \sigma') \right] - \frac{a''' - a'}{v_i} + \frac{1}{v_i} (v_s''' \sigma''' - v_s' \sigma') \quad (22)$$

and

$$v_i = \frac{(s_s''' - s_s') - (a''' - a') + v_s''' \sigma''' - v_s' \sigma'}{\rho_w} \quad (23)$$

Pyknometer Determinations.—(2) *Solids*.—The following equations are based on two pyknometer weighings and a separate determination of the mass of the object. If the pyknometer is used as a container for weighing the object this requires two weighings. (See p. 76 to 78.)

The symbol " refers to the weighing with the calibrating liquid alone; "' to the weighing with both this liquid and the object being studied.

Under requirements A and C only,

$$\rho_m = m \frac{(s''' - s'') + (a''' - a'') - [v_s''' - v_s''] \sigma''' + [v_s'' - v_s''] \sigma''}{(s''' - s') + (a''' - a') - [v_s''' - v_s'] \sigma''' + [v_s'' - v_s''] \sigma''} \quad (24)$$

Under requirement B, in addition to A and C, equation (24) may be put into the form (25) by combining the terms in s with those in $v\sigma$.

$$\rho_m = m \frac{(s_s''' - s_s'') + (a''' - a'') - b(v_s''' \sigma''' - v_s'' \sigma'')}{(s_s''' - s_s') + (a''' - a') - b(v_s''' \sigma''' - v_s' \sigma')} \quad (25)$$

Under requirements D and E, in addition to A, B, and C,

$$\rho_m = m \frac{(s_s''' - s_s'')}{(s_s''' - s_s')} \quad (26)$$

This equation is independent of the magnitudes of σ , c , and v_s , merely requiring their constancy.

Hydrostatic Weighings for Density of Solids.—These equations are based on two weighings; one with the object in air and one with it suspended in a liquid (e.g., water) of known density. The equilibrium equations for these weighings are

$$m' - v_m' \sigma' = s' - v_s' \sigma'$$

and

$$m'' - v_m'' \rho_w = s'' - v_s'' \sigma''$$

the notation being similar to that used for pyknometer weighings. If the mass of the object remains constant (i.e., $m' = m''$), (27) is an exact solution of these equations.

$$\rho_m = \frac{s_s' - s_s''}{s_s' - s_s''} (\rho_w [1 + \beta_m(l'' - t)] - \sigma') + \sigma' \quad (27)$$

If also all temperatures, the air density, and the density of the weights are the same in the two weighings,

$$\rho_m = \frac{s_s' - s_s''}{s_s' - s_s''} (\rho_w - \sigma) + \sigma \quad (28)$$

Correction Formula.—When the result of a density determination is calculated without any correction for the buoyant effect

of the air, a false value (ρ_f) is obtained except for pycnometer determinations in which the conditions of the work are those specified for equation (17)

If for pycnometer determinations, these false values were computed by means of the equation $\rho_f = \frac{s'' - s'}{s'' - s'} \rho_w$ and for hydrostatic

weighings of solids by means of the equation $\rho_f = \frac{s'}{s'' - s'} \rho_w$, then to the precision attainable by assuming that the conditions were those specified for equations (16) or (28) the values may be corrected by the equation

$$\rho = \rho_f \left(1 - \frac{\sigma}{\rho_w}\right) + \sigma \quad (29)$$

VOLUME OF A MASS OF LIQUID OF KNOWN WEIGHT IN AIR

(See also p. 73)

VERNEY STOTT AND PHILIP H. BIGG

Symbols. $F = \frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_0}}$; t = temperature of the liquid when its volume is V ; t_w = temperature of the liquid when weighed; V = volume of the liquid at temperature t ; W = weight of the liquid in air against weights of density Δ ; ρ , ρ_0 = density of the liquid at t and at t_w , respectively; σ = density of air at time of weighing.

If densities are expressed in g/cm³, and W in g, V is in cm³; if

densities are in g/ml and W in g, V is in ml; if densities are in lb./gal., and W in lb., V is in gal.; etc.

The exact relations connecting these quantities are given by the equation

$$V = W \left(\frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_0}} \right) = W \left(\frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_0}} \right) \left(\frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_0}} \right) = FW \left(\frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_0}} \right)$$

VALUES OF F FOR WATER AND MERCURY

(Liquids are air-free)

$$V = FW \frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_0}}$$

In many cases the factor $\left(\frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_0}} \right)$ does not differ significantly from unity. If $t_0 = 20^\circ\text{C}$, the greatest value of this factor for the temperature range covered by the following table differs from unity by only 7.3×10^{-4} for water and by 0.48×10^{-3} for mercury.

If $t_w = t$, $V = FW$. For water, $F = 1 + 0.001 K_{\text{H}_2\text{O}}$; for mercury, $F = 0.07 + 0.001 K_{\text{Hg}}$

Unit of F = milliliter per g of W ; of t = $^\circ\text{C}$. Assumes* $\sigma = 0.0012$ g/ml; $\Delta = 8.3$ g/ml.

t	$K_{\text{H}_2\text{O}}$	K_{Hg}	t	$K_{\text{H}_2\text{O}}$	K_{Hg}	t	$K_{\text{H}_2\text{O}}$	K_{Hg}	t	$K_{\text{H}_2\text{O}}$	K_{Hg}	t	$K_{\text{H}_2\text{O}}$	K_{Hg}
0	1.189	3.550	10	1.330	3.683	20	2.832	3.817	30	5.410	3.951	40	8.890	4.085
1	1.130	3.563	11	1.425	3.697	21	3.044	3.830	31	5.720	3.964	41		4.098
2	1.089	3.576	12	1.533	3.710	22	3.267	3.844	32	6.038	3.977	42		4.111
3	1.065	3.590	13	1.654	3.723	23	3.501	3.857	33	6.366	3.991	43		4.125
4	1.057	3.603	14	1.788	3.737	24	3.744	3.870	34	6.702	4.004	44		4.138
5	1.065	3.616	15	1.933	3.750	25	3.998	3.884	35	7.046	4.018	45		4.152
6	1.089	3.630	16	2.090	3.763	26	4.261	3.897	36	7.399	4.031	46		4.165
7	1.127	3.643	17	2.259	3.777	27	4.534	3.910	37	7.760	4.044	47		4.178
8	1.181	3.656	18	2.438	3.790	28	4.817	3.924	38	8.129	4.058	48		4.192
9	1.248	3.670	19	2.630	3.803	29	5.109	3.937	39	8.505	4.071	49		4.205
												50		4.219

* The increase (dK) produced in K by changing Δ to $\Delta(1 + \delta)$ and σ to $\sigma(1 + s)$ is closely given ($\pm 0.1\%$) for the range of this table by the equations:

$$dK_{\text{H}_2\text{O}} = 0.14s(7.3s + 0.997\delta + 8.3s\delta) \frac{1}{1 + \delta}$$

$$dK_{\text{Hg}} = 0.00078(-3.3s + 13.6\delta + 8.3s\delta) \frac{1}{1 + \delta}$$

units being those of this table. For uncertainties in σ , and for the variation of σ with pressure, temperature, and humidity, see p. 78. When brass weights are not used, δ will, in general, be large, in such cases it is desirable to transform the equations once for all by inserting the proper value for δ ; they will take the convenient form $dK = a + bs$. If $\delta = 0$, $dK_{\text{H}_2\text{O}} = 1.0s$, $dK_{\text{Hg}} = 0.0041s$. If $s = 0$, $dK_{\text{H}_2\text{O}} = 0.14s \frac{\delta}{1 + \delta}$, $dK_{\text{Hg}} = 0.010s \frac{\delta}{1 + \delta}$.

Example.—(1) If $\sigma = 0.00132$ and $\Delta = 8.383$, $s = 0.1$, $\delta = 0.01$ and $dK_{\text{H}_2\text{O}} = 0.14s(0.73 + 0.01 + 0.008) \frac{1}{1.01} = 0.144(0.75) = 0.108$. Hence, if $t = 19^\circ\text{C}$, $K_{\text{H}_2\text{O}} = 2.63 + 0.108 = 2.74$.

(2) If $\sigma = 0.00132$ and $\Delta = 2.65$ (quartz), $s = 0.1$, $(1 + \delta) = \frac{2.65}{8.3}$, $\delta = -\frac{5.65}{8.3}$, and $dK_{\text{Hg}} = 0.00078(-0.53 - 9.26 - 0.565)(3.13) = -0.0253$. Hence, if $t = 25^\circ\text{C}$, $K_{\text{Hg}} = 3.884 - 0.025 = 3.859$.

STANDARD BUFFER SOLUTIONS AND ACID-BASE INDICATORS

MANSFIELD CLARK

In the following tables pH represents (formalistically) $\log_{10} \frac{1}{[H^+]}$ where $[H^+]$ is the symbol for grams of hydrogen ions per liter. Since there is a disagreement concerning the precise interpretation of experimental values, the experimental meaning of pH is defined by the set of conditions described below (8, 57).

The normal hydrogen-electrode is regarded as a properly coated, noble metal, under one atmosphere partial-pressure of hydrogen, immersed in a solution normal with respect to hydrogen ions. The difference of potential between electrode and solution is regarded as zero at all temperatures.

The following values are regarded as standard differences of potential (E_c) (liquid-junction potential-difference being eliminated) between the tenth-normal KCl— Hg_2Cl_2 —Hg half-cell and the hypothetical, normal hydrogen-electrode.

T°	18	20	25	30	37.5	40	50	60
E_c	0.3380	0.3379	0.3376	0.3372	0.3364	0.3360	0.3341	0.3317

For present purposes it is assumed that the liquid-junction potential-difference between an Hg_2Cl_2 half-cell solution and the solution the pH of which is under measurement has been eliminated when there has been interposed a saturated solution of KCl, or when there has been employed the Bjerrum extrapolation (4) from measurements made with 3.5N KCl and 1.75N KCl as interposed solutions.

When the electromotive force, e in v , of the "chain",

H_2Pt	$[H^+]$	KCl	KCl	Hg_2Cl_2/Hg
		saturated	0.1N	

is measured under the above conditions, and the Hg is positive to the Pt, pH is calculated from the equation

$$E.M.F. - E_c \\ 0.00019837(273.09 + t) = pH.$$

(See (8, 37, 45, 64) and references therein on potentiometric measurement of pH.)

The chief modes of employing indicators for the determination of pH may be illustrated by the following examples.

I. A solution having been found to induce a blue color with brom thymol blue (see No. 139, Table 3A), a yellow color with thymol blue (No. 129), and a color intermediate between yellow and red with phenol red (No. 142) is judged to have a pH value between 7.0 and 7.8. Then to 10 ± 0.05 cc of solution are added 5 drops 0.04% phenol red solution (made by dissolving 0.1 g phenol red in 28.5 cc 0.01N NaOH solution and diluting to 250 cc). The resulting mixture is then compared with standards made by adding 5 drops of the same phenol red solution to each of 10 ± 0.05 cc portions of buffers having pH values of 7.0, 7.2, 7.4, 7.6, etc. (See Table 1A.)

The comparison is made in containers of identical dimensions and under uniform illumination. It is found that the tested solution has a color intermediate and half-way between those of buffers 7.4 and 7.6, and since the total salt contents of the tested solution and of the buffers are of the same order of magnitude, and since the solution contains no protein or substance known to affect the indicator, 7.5 is judged to be the true pH value of the tested solution (8, 11, 31, 37, 45, 53, 54, 56).

II. A solution is found to induce a partial color transformation of phenol red. Using uniform containers (e.g., test tubes) there are prepared:

(1) A mixture of 10 ± 0.05 cc solution under test and 10 drops standard phenol red solution (see I).

(2) A mixture of x drops of indicator and sufficient buffer solution of the value shown in column B of Table 3A to equal the total volume of solution 1.

(3) A mixture of $10 - x$ drops of indicator and sufficient buffer of the value shown in column C of Table 3A to equal the total volume of solution 1.

x is varied and there is found at $x \approx 4$ a match in color between solution 1 and superposed solutions 2 and 3. From the relation:

$$pH = pK + \log \frac{x}{10 - x}, \text{ and the value } 7.8 \text{ for } pK \text{ given in Table}$$

3A it is calculated that the value of the tested solution is 7.6 (see in addition to the general references under I (3, 19, 20, 22, 34, 63).

III. A solution is found to induce a partial color-transformation in *m*-nitrophenol (No. 15, Table 3C). It is found that 10 cc of the tested solution plus 1 cc of 0.3% *m*-nitrophenol matches in color 11 cc of an alkalinized solution containing 0.2 cc of 0.3% *m*-nitrophenol. It is thus shown that the tested solution has induced a 20% transformation. If a is the percentage transformation of the indicator, pH is calculated from

$$pH = pK + \log \frac{a}{100 - a}$$

In the case at hand $a = 20$, the temperature of the measurement was 25° and the total salt content of the solution was of the order of magnitude of 0.15M. Hence from Table 3C, pK is taken as 8.16. By the above equation $pH = 7.56$.

The equation $pH = pK + \log \frac{a}{100 - a}$ cannot be used with

picric acid, phenolphthalein or Alizarine yellow GG listed in Table 3C, since these indicators do not behave as monoacidic within the range of pH specified. Empirical data (38) for phenolphthalein and Alizarine yellow GG are shown in Table 4. It is best to vary the amounts of indicator used till the most favorable color-differences are found. (In addition to the material found in the general references under I see (30, 31, 38, 39) for method III.)

pH in the tables represents the pH at which there is an apparent half-transformation of the indicator. For indicators behaving as monoacidic or monobasic, within the zone of pH designated, pK is $\log 1/K_a$ when K_a is the "apparent dissociation constant" (43). When an indicator, such as phenolphthalein, is known not to behave as monoacidic within the range of pH designated, pK is bracketed.

pK values listed in Tables 3A and 3C are uniform with respect to the bases of reference. Those of the indicators in the general list (Table 2) are referred to such a variety of bases that tabulation is impracticable. The reader is therefore referred to original articles (8, 31, 37, 43, 45, 51, 58, 59, 60, 61, 67.)

The values assigned to useful pH ranges are somewhat arbitrary, depending upon concentration of indicator, the spectral distribution of illumination, and psychological preferences.

Indicator solutions are affected to various degrees by

- Total salt content.
- Specific ions: e.g., alizarine red 8 is affected by borates differently than by phosphates (67).
- Colloidal suspensions, protein solutions, etc.: e.g., congo red in a gelatine solution of pH 3.6 behaved as if the pH were 5.6 (53). Neutral red in soap solutions forms a fatty acid complex (27).
- Presence of immiscible solvents: e.g., chloroform used for disinfection removes benzene-azo-benzyl-aniline from the aqueous phase (53).

e. Mixed solvents and change of solvent (3, 31, 32, 40, 62).

f. Temperature. See Table 3A, 3C.

g. Time: e.g., water blue changes color slowly and propyl red precipitates

h. Destructive agents: e.g., methyl red is irreversibly reduced in some bacterial cultures.

Since it is impracticable to tabulate all available data, only representative "salt" and temperature effects are given in Tables 3A, 3B and 4.

The indicators of Table 3 include the better of those which may be used in acidimetric and alkalimetric titration. (For principles see (5, 31, 43, 45).)

TABLE 1.—STANDARD BUFFER SOLUTIONS

The following tables give the compositions of solutions which furnish, at the temperatures indicated, values of pH which conform in essential respects to the specifications listed in the general notes above. Recalculation to make the conformity rigid would involve changes in the original data which would be less than the uncertainties of the working standards used in the experiments. The solutions listed may serve as standards for the colorimetric measurements of pH. The solutions suffer relatively slight displacement of pH with addition or subtraction of small proportions of acid or alkali. This property is referred to as that of a *buffer* (*puffer*, *tampon*). (For buffer solutions see (5, 37, 45, 64).)

A. STANDARD BUFFER SOLUTIONS OF CLARK AND LUBS (10) AT 20°
50 cc A + x cc B diluted to 200 cc

A = 0.2M KCl* B = 0.2M HCl		A = 0.2M KH o-phthal- ate B = 0.2M HCl		A = 0.2M KH o-phthal- ate B = 0.2M NaOH		A = 0.2M KH ₂ PO ₄ B = 0.2M NaOH		A = 0.2M H ₂ BO ₃ † + 0.2M KCl B = 0.2M NaOH	
pH	cc B	pH	cc B	pH	cc B	pH	cc B	pH	cc B
1.2	61.5	2.2	16.70	4.0	0.40	5.8	3.72	7.8	2.61
1.4	41.5	2.4	39.60	4.2	3.70	6.0	5.70	8.0	3.97
1.6	26.3	2.6	32.95	4.4	7.50	6.2	8.60	8.2	5.90
1.8	16.6	2.8	26.12	4.6	12.15	6.4	12.60	8.4	8.50
2.0	10.6	3.0	20.32	4.8	17.70	6.6	17.80	8.6	12.00
2.2	6.7	3.2	14.70	5.0	23.85	6.8	23.65	8.8	16.30
		3.4	9.90	5.2	29.95	7.0	29.63	9.0	21.30
		3.6	5.97	5.4	35.45	7.2	35.00	9.2	26.70
		3.8	2.63	5.6	39.85	7.4	39.50	9.4	32.00
				5.8	43.00	7.6	42.80	9.6	36.85
				6.0	45.15	7.8	45.20	9.8	40.80
				6.2	47.00	8.0	46.80	10.0	43.90

B. SØRENSEN'S GLYCOCOLL-NA⁺CL-⁻HCL MIXTURES (56)
Glycocoll solution: 0.1M Glycocoll + 0.1M NaCl per l; HCl
0.1N. Values hold between 10°-70° (66)

Glycocoll (cc)	0 0	1 0	2 0	3 0	4 0	5 0
HCl (cc)	10 0	9 0	8 0	7 0	6 0	5 0
pH	1 04	1 15	1 25	1 42	1 65	1 93

Glycocoll (cc)	6 0	7 0	8 0	9 0	9 5
HCl (cc)	4 0	3 0	2 0	1 0	0 5
pH	2 28	2 61	2 92	3 34	3 68

C. SØRENSEN'S CITRATE-HCL MIXTURES (56)
Citrate solution: 21.008 g crystn. citric acid + 200 cc N NaOH per
l; HCl: 0.1N. Values hold between 10°-70° (66)

Citrate (cc)....	0 0	1 0	2 0	3 0	3 33	4 0	4 5	4 75
HCl (cc).....	10 0	9 0	8 0	7 0	6 67	6 0	5 5	5 25
pH	1 04	1 17	1 42	1 93	2 27	2 97	3 36	3 53

* The pH values of these mixtures are given by Clark and Lubs as preliminary measurements

† The old atomic weight (11.0) of Boron is used throughout these tables

Citrate (cc)....	5.0	5.5	6.0	7.0	8.0	9.0	9.5	10.0
HCl (cc)	5.0	4.5	4.0	3.0	2.0	1.0	0.5	0.0
pH	3.69	3.95	4.16	4.45	4.65	4.83	4.89	4.96

D. SØRENSEN'S PHOSPHATE MIXTURES (55, 56)
9.078 g KH₂PO₄, 11.876 g Na₂HPO₄·2H₂O each per l. Values
hold between 10°-70° (66).

Na ₂ HPO ₄ (cc)	0.25	0.5	1.0	2.0	3.0	4.0
KH ₂ PO ₄ (cc)	9.75	9.5	9.0	8.0	7.0	6.0
pH	5.29	5.59	5.91	6.24	6.47	6.64

Na ₂ HPO ₄ (cc)	5.0	6.0	7.0	8.0	9.0	9.5
KH ₂ PO ₄ (cc)	5.0	4.0	3.0	2.0	1.0	0.5
pH	6.81	6.98	7.17	7.38	7.73	8.04

E. SØRENSEN'S CITRATE-NAOH MIXTURES (56); WALBUM'S
VALUES (66)

Citrate solution; 21.008 g crystn. citric acid + 200 cc N NaOH
per l; NaOH: 0.1N

Volume parts		Temperature						
Citrate	NaOH	10°	20°	30°	40°	50°	60°	70°
10.0	0.0	4.93	4.96	5.00	5.04	5.07	5.10	5.14
9.5	0.5	4.99	5.02	5.06	5.10	5.13	5.16	5.20
9.0	1.0	5.08	5.11	5.15	5.19	5.22	5.25	5.29
8.0	2.0	5.27	5.31	5.35	5.39	5.42	5.45	5.49
7.0	3.0	5.53	5.57	5.60	5.64	5.67	5.71	5.75
6.0	4.0	5.94	5.98	6.01	6.04	6.08	6.12	6.15
5.5	4.5	6.30	6.34	6.37	6.41	6.44	6.47	6.51
5.25	4.75	6.65	6.69	6.72	6.76	6.79	6.83	6.86

F. SØRENSEN'S BORATE-HCL MIXTURES (56); WALBUM'S
VALUES (66)

Borate: 12.404 g H₃BO₃ + 100 cc N NaOH per l; HCl: 0.1N

Volume parts		Temperature						
Borate	HCl	10°	20°	30°	40°	50°	60°	70°
10.0	0.0	9.30	9.23	9.15	9.08	9.00	8.93	8.86
9.5	0.5	9.22	9.15	9.08	9.01	8.94	8.87	8.80
9.0	1.0	9.14	9.07	9.01	8.94	8.87	8.80	8.74
8.5	1.5	9.06	8.99	8.92	8.86	8.80	8.73	8.67
8.0	2.0	8.96	8.89	8.83	8.77	8.71	8.65	8.59
7.5	2.5	8.84	8.79	8.72	8.67	8.61	8.55	8.50
7.0	3.0	8.72	8.67	8.61	8.56	8.50	8.45	8.40
6.5	3.5	8.54	8.49	8.44	8.40	8.35	8.30	8.26
6.0	4.0	8.32	8.27	8.23	8.19	8.15	8.11	8.08
5.75	4.25	8.17	8.13	8.09	8.06	8.02	7.98	7.95
5.5	4.5	7.96	7.93	7.89	7.86	7.82	7.79	7.76
5.25	4.75	7.64	7.61	7.58	7.55	7.52	7.49	7.47

H. SØRENSEN'S BORATE-NAOH MIXTURES (56); WALBUM'S
VALUES (66)

Borate: 12.404 g H₃BO₃ + 100 cc N NaOH per l; NaOH: 0.1N

Volume parts		Temperature							
Borate	NaOH	10°	14°	18°	22°	26°	30°	34°	37°
10	0.0	9.30	9.27	9.24	9.21	9.18	9.15	9.13	9.11
9	1	9.42	9.39	9.36	9.33	9.29	9.26	9.23	9.20
8	2	9.57	9.54	9.50	9.46	9.43	9.39	9.35	9.32
7	3	9.76	9.72	9.68	9.63	9.59	9.55	9.50	9.47
6	4	10.06	10.02	9.97	9.91	9.86	9.80	9.75	9.71
5	5	11.24	11.16	11.08	10.99	10.91	10.82	10.74	10.68
4	6	12.64	12.51	12.38	12.25	12.13	12.00	11.87	11.77

Continued on p. 84

BUFFER SOLUTIONS AND INDICATORS

83

G. SØRENSEN'S GLYCOCOLL- NaCl - NaOH MIXTURES (); WALBRUM'S VALUES (**)**

Glycocoll: 7.505 g glycocoll + 5.85 g NaCl per l; NaOH : 0.1N

Volume parts		Temperature															
Glycocoll	NaOH	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	37°	40°	
9.5	0.5	8.75	8.70	8.66	8.62	8.58	8.53	8.49	8.45	8.40	8.37	8.32	8.28	8.24	8.18	8.12	
9.0	1.0	9.10	9.06	9.02	8.97	8.93	8.88	8.84	8.79	8.75	8.71	8.67	8.62	8.58	8.52	8.45	
8.0	2.0	9.54	9.50	9.45	9.40	9.36	9.31	9.26	9.22	9.17	9.13	9.08	9.04	9.00	8.92	8.85	
7.0	3.0	9.90	9.85	9.80	9.75	9.71	9.66	9.61	9.56	9.51	9.46	9.42	9.37	9.32	9.25	9.18	
6.0	4.0	10.34	10.29	10.24	10.18	10.14	10.09	10.03	9.98	9.93	9.88	9.83	9.78	9.73	9.66	9.58	
5.5	4.5	10.68	10.63	10.58	10.53	10.48	10.42	10.37	10.32	10.27	10.22	10.17	10.12	10.07	9.99	9.91	
5.1	4.9	11.29	11.24	11.18	11.12	11.07	11.01	10.96	10.90	10.85	10.79	10.74	10.68	10.62	10.54	10.46	
5.0	5.0	11.53	11.48	11.42	11.36	11.31	11.25	11.20	11.14	11.09	11.03	10.97	10.92	10.86	10.78	10.70	
4.9	5.1	11.80	11.74	11.68	11.62	11.57	11.51	11.45	11.39	11.33	11.27	11.22	11.16	11.10	11.02	10.93	
4.5	5.5	12.34	12.28	12.22	12.16	12.10	12.04	11.98	11.92	11.86	11.80	11.74	11.68	11.62	11.53	11.44	
4.0	6.0	12.65	12.59	12.52	12.46	12.40	12.33	12.27	12.21	12.15	12.09	12.03	11.96	11.90	11.81	11.72	
3.0	7.0	12.92	12.86	12.80	12.73	12.67	12.60	12.54	12.48	12.42	12.35	12.29	12.23	12.17	12.07	11.98	
2.0	8.0	13.12	13.06	12.99	12.92	12.86	12.79	12.73	12.66	12.60	12.53	12.47	12.41	12.34	12.25	12.15	
1.0	9.0	13.23	13.16	13.09	13.03	12.97	12.90	12.83	12.77	12.70	12.64	12.57	12.51	12.45	12.35	12.25	

Volume parts		Temperature														
Glycocoll	NaOH	42°	44°	46°	48°	50°	52°	54°	56°	58°	60°	62°	64°	66°	68°	70°
9.5	0.5	8.07	8.03	7.99	7.95	7.91	7.86	7.82	7.78	7.74	7.69	7.65	7.61	7.56	7.52	7.48
9.0	1.0	8.41	8.37	8.32	8.28	8.24	8.19	8.14	8.10	8.06	8.02	7.97	7.93	7.88	7.84	7.79
8.0	2.0	8.81	8.76	8.72	8.67	8.63	8.58	8.53	8.49	8.44	8.40	8.35	8.30	8.26	8.21	8.16
7.0	3.0	9.13	9.08	9.03	8.99	8.94	8.89	8.84	8.79	8.74	8.70	8.65	8.60	8.55	8.50	8.45
6.0	4.0	9.53	9.48	9.43	9.38	9.33	9.28	9.23	9.18	9.13	9.08	9.03	8.98	8.93	8.88	8.82
5.5	4.5	9.86	9.81	9.76	9.71	9.66	9.61	9.56	9.51	9.46	9.41	9.35	9.30	9.25	9.20	9.15
5.1	4.9	10.40	10.35	10.29	10.24	10.18	10.13	10.07	10.02	9.96	9.90	9.85	9.79	9.74	9.68	9.62
5.0	5.0	10.64	10.59	10.54	10.48	10.43	10.37	10.32	10.26	10.20	10.14	10.09	10.04	9.98	9.93	9.87
4.9	5.1	10.87	10.81	10.75	10.69	10.64	10.58	10.52	10.46	10.40	10.35	10.29	10.23	10.17	10.11	10.05
4.5	5.5	11.38	11.32	11.26	11.20	11.14	11.08	11.02	10.96	10.90	10.84	10.78	10.72	10.66	10.60	10.54
4.0	6.0	11.65	11.59	11.53	11.47	11.41	11.34	11.28	11.22	11.16	11.10	11.03	10.97	10.91	10.84	10.78
3.0	7.0	11.91	11.85	11.79	11.73	11.66	11.60	11.54	11.47	11.41	11.35	11.28	11.22	11.16	11.09	11.03
2.0	8.0	12.08	12.02	11.96	11.89	11.83	11.77	11.70	11.64	11.57	11.51	11.44	11.38	11.31	11.25	11.18
1.0	9.0	12.19	12.13	12.06	12.00	11.94	11.87	11.80	11.74	11.67	11.61	11.54	11.48	11.41	11.35	11.28

J. pH VALUES OF BORAX-BORATE MIXTURES AT 18°C AND "SALT-EFFECTS" FOR PHENOLPHTHALEIN AND α -NAPHTHOLPHTHALEIN
PALITZSCH (44)

Borax solution: 19.108 g $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ in 1 l. Boric acid solution: 12.404 g H_3BO_3 + 2.925 g NaCl in 1 l

Standard solutions			True pH values of sea water containing S parts per 1000 salinity at color-match with standard											
Borax cc	Boric acid cc	pH	S = 36	S = 30	S = 26	S = 22	S = 18	S = 14	S = 10	S = 6	S = 4	S = 2	S = 1	
6.0	4.0	8.69	8.48	8.49	8.50	8.52	8.54	8.57	8.59	8.63	8.66	8.69	8.72	Phenolphthalein
5.5	4.5	8.60	8.39	8.40	8.41	8.43	8.45	8.48	8.50	8.54	8.57	8.60	8.63	
5.0	5.0	8.51	8.30	8.31	8.32	8.34	8.36	8.39	8.41	8.45	8.48	8.51	8.54	
4.5	5.5	8.41	8.20	8.21	8.22	8.24	8.26	8.29	8.31	8.35	8.38	8.41	8.44	
4.0	6.0	8.31	8.10	8.11	8.12	8.14	8.16	8.19	8.21	8.25	8.28	8.31	8.34	
3.5	6.5	8.20	7.99	8.00	8.01	8.03	8.05	8.08	8.10	8.14	8.17	8.20	8.23	α -Naphtholphthalein
4.5	5.5	8.41	8.19	8.20	8.21	8.23	8.25	8.28	8.32	8.37	8.40	8.45	8.48	
4.0	6.0	8.31	8.09	8.10	8.11	8.13	8.15	8.18	8.22	8.27	8.30	8.35	8.38	
3.5	6.5	8.20	7.98	7.99	8.00	8.02	8.04	8.07	8.11	8.16	8.19	8.24	8.27	
3.0	7.0	8.08	7.86	7.87	7.88	7.90	7.92	7.95	7.99	8.04	8.07	8.12	8.15	
2.5	7.5	7.94	7.72	7.73	7.74	7.76	7.78	7.81	7.85	7.90	7.93	7.98	8.01	
2.3	7.7	7.88	7.66	7.67	7.68	7.70	7.72	7.75	7.79	7.84	7.87	7.92	7.95	
2.0	8.0	7.78	7.56	7.57	7.58	7.60	7.62	7.65	7.69	7.74	7.77	7.82	7.85	
1.5	8.5	7.60	7.38	7.39	7.40	7.42	7.44	7.47	7.51	7.56	7.59	7.64	7.67	
1.0	9.0	7.36	7.14	7.15	7.16	7.18	7.20	7.23	7.27	7.32	7.35	7.40	7.43	
0.6	9.4	7.09	6.87	6.88	6.89	6.91	6.93	6.96	7.00	7.05	7.08	7.13	7.16	
0.3	9.7	6.77	6.55	6.56	6.57	6.59	6.61	6.64	6.68	6.73	6.76	6.81	6.84	

H. SØRENSEN'S BORATE- NaOH MIXTURES.—(Continued)

Volume parts		Temperature							
Borate	NaOH	40°	44°	48°	52°	56°	60°	64°	70°
10	0 0	9 08	9 05	9 02	9 00	8 97	8 93	8 90	8 86
9	1	9 18	9 15	9 11	9 08	9 05	9 01	8 98	8 94
8	2	9 30	9 26	9 22	9 18	9 15	9 11	9 08	9 02
7	3	9 44	9 40	9 35	9 31	9 27	9 22	9 18	9 12
6	4	9 67	9 62	9 56	9 51	9 46	9 40	9 35	9 28
5	5	10 61	10 53	10 44	10 36	10 27	10 19	10 10	9 98
4	6	11 68	11 55	11 42	11 29	11 17	11 04	10 91	10 72

I. ACETIC ACID-ACETATE MIXTURES; WALPOLE'S VALUES
(RECALCULATED) (68)

$\text{CH}_3\text{CO}_2\text{H}$ M.	...	0 185	0 176	0 164	0 147	0 126	0 102
$\text{CH}_3\text{CO}_2\text{Na}$ M	...	0 015	0 024	0 036	0 053	0 074	0 098
pH		3 6	3 8	4 0	4 2	4 4	4 6
$\text{CH}_3\text{CO}_2\text{H}$ M	..		0 080	0 059	0 042	0 029	0 019
$\text{CH}_3\text{CO}_2\text{Na}$ M			0 120	0 141	0 158	0 171	0 181
pH			4 8	5 0	5 2	5 4	5 6

TABLE 2.—GENERAL LIST OF INDICATORS

The following list of indicators includes all those for which data on the pH-ranges have been found. Many of the data of this table are to be regarded with caution, because in some cases the names proposed are inadequate for complete identification, and in others names have been given to materials of uncertain composition (5, 11, 31, 37, 45, 53, 54, 56, 64).

The Schultz (S.) and Rowe (R.) numbers are taken from the 1923 (52) and 1924 (48) editions, respectively, of these works. Delicate shades of meaning in the color nomenclature have often been lacking. The abbreviations used are as follows: b, blue; br, brown; c, colorless; f, fades; fl, fluorescent; g, green; o, orange; p, pink; pu, purple; r, red; v, violet; y, yellow. pK is the pH at which there is an apparent half-transformation of the indicator. * indicates that the indicator has been studied in sufficient detail to be used in supplementing the lists of Table 3.

NITRO COMPOUNDS

Index No.	Indicator	Color and useful range pH	Lit.
1	2, 4, 6-Trinitrophenol; Picric acid [S. 5; R. 7]	c 0 0–1.3 y	(31, 39)
2	2, 6-Dinitrophenol [Michaelis' β]	c 2.0–4.0 y	(31, 38, 39)
3	2, 4-Dinitro- α -naphthol; Manchester yellow [S. 6; R. 9]	y 2.0–4.0 y	(9)
4	2, 4-Dinitrophenol [Michaelis' α]	c 2.6–4.4 y	(31, 38, 39)
5	Dinitrohydroquinol	3–10	(23, 46)
6	Nitrohydroquinol	3–11	(46)
7	2, 3-Dinitrophenol [Michaelis' ϵ]	c 3.9–5.9 y	(31, 38, 39)
8	2, 5-Dinitrophenol [Michaelis' γ]	c 4.0–5.8 y	(31, 38, 39)
9	2, 6-Dinitro-4-aminophenol; Isopiramic acid.	p 4 1–5 6 y	(67)
10	3, 4-Dinitrophenol [Michaelis' δ]	c 4 3–6 3 y	(38, 39)
11	4-Nitro-6-aminoguaiacol	y 4 5–8 0 r	(35)
12	<i>p</i> -Nitrophenol	c 5.6–7 6 y	(31, 38, 39, 56)
13	α -Nitrophenol	c 5 0–7 0 y	(46)
14	*Dinitrobenzoylene urea	c 6 0–8 0 y	(6)
15	<i>m</i> -Nitrophenol	c 6 8–8 6 y	(31, 38, 39)
16	2, 4, 6-Trinitrophenyl-methyl-nitroamine; Nitramine	c 10 8–13 0 br	(31, 33)
17	<i>sym</i> -Trinitrobenzene.	c 12 0–14 0 o; f	(50)
18	2, 4, 6-Trinitrotoluene	p 11 5–14 0 o	(9)

MONO-AZO COMPOUNDS

19	<i>p</i> -Toluene-azo-phenyl-aniline	1 0–2 0	(53, 54, 56)
20	<i>p</i> -Carboxybenzene-azo-dimethylaniline; Para methyl red	r 1 0–3 0 y	(9, 60)
21	<i>p</i> -Toluene-azo-phenyl- α -naphthylamine	1 1–1 9	(53, 54, 56)
22	Benzene-azo-diphenylamine	p 1 2–2 1 y	(56)
23	<i>m</i> -Benzenesulfonic acid-azo-diphenylamine; Metanal yellow [S. 134; R. 138]	r 1 2–2 3 y	(56)
24	Benzene-azo-phenyl- α -naphthylamine	v 1 4–2 6 o	(53, 54, 56)
25	<i>p</i> -Benzenesulfonic acid-azo-diphenylamine; Tropaeolin OO [S. 139; R. 143]	r 1 4–2 6 y	(56, 60)
26	α -Toluene-azo- α -toluidine; Spirit yellow R [S. 68; R. 17]	1 4–2 9	(53, 54, 56)
27	<i>p</i> -Toluene-azo-benzyl- α -naphthylamine.	1 6–2 6	(53, 54, 56)
28	<i>p</i> -Toluene-azo-benzyl-aniline	1 6–2 8	(53, 54, 56)
29	Benzene-azo-benzyl- α -naphthylamine.	1 9–2 9	(53, 54, 56)
30	Benzene-azo-aniline; Amino-azo-benzene [S. 31; R. 15]	y 1 9–3 3 y	(53, 54, 56, 60)
31	<i>p</i> -Benzenesulfonic acid-azo-aniline	r 1 9–3 3 y	(52, 53, 54, 60)
32	<i>p</i> -Benzenesulfonic acid-azo-benzylaniline	r 1 9–3 3 y	(56, 60)
33	<i>m</i> -Carboxybenzene-azo-dimethylaniline	r 2 0–4 0 y	(11)
34	Benzene-azo-benzylamine	p 2 3–3 3 y	(56)
35	<i>p</i> -Benzenesulfonic acid-azo- <i>m</i> -chlorodiphenylamine	r 2 6–4 0 y	(56, 60)
36	<i>m</i> -Nitrobenzene-azo- β -naphthol-3, 6-disulfonic acid; Orange III [S. 47; R. 39]	r 2 6–4 6 y	(9)
37	Benzene-azo-dimethylaniline; Topfer's indicator [S. 32; R. 19] ...	r 2 9–4 0 y	(56, 60)
38	α -Carboxybenzene-azo- α -naphthylamine	r 2 9–5 8 y	(61)
39	<i>p</i> -Benzenesulfonic acid-azo- α -toluidine	mid-point 2 9	(60)

MONO-AZO COMPOUNDS.—(Continued)			
Index No.	Indicator	Color and useful range pH	Lit.
40	<i>p</i> -Benzenesulfonic acid-azo- <i>m</i> -xylylidine.	mid-point 2.9	(60)
41	<i>o</i> -Carboxybenzene-azo-diphenylamine	p 3.0–4.6 y	(11)
42	<i>p</i> -Benzenesulfonic acid-azo-methylaniline	r 3.1–4.2 y	(53, 54, 56, 60)
43	<i>p</i> -Benzenesulfonic acid-azo-ethyl aniline	r 3.1–4.4 y	(53, 54, 56, 60)
44	<i>p</i> -Benzenesulfonic acid-azo-dimethylaniline; Methyl orange [S. 138; R. 142]	r 3.1–4.4 y	(56, 60)
45	<i>p</i> -Benzenesulfonic acid-azo-diethylaniline; Ethyl orange	r 3.5–4.5 y	(53, 54, 56, 60)
46	<i>o</i> -Benzenesulfonic acid-azo-dimethylaniline	mid-point 3.5	(60)
47	<i>p</i> -Benzenesulfonic acid-azo- <i>o</i> -toluidine	mid-point 3.5	(60)
48	<i>p</i> -Benzenesulfonic acid-azo- <i>p</i> -xylylidine	mid-point 3.6	(60)
49	* <i>p</i> -Sulfo- <i>o</i> -methoxybenzene-azo-dimethyl- α -naphthylamine	b 3.5–4.0 o	(42)
50	<i>p</i> -Benzenesulfonic acid-azo- α -naphthylamine	r 3.5–5.7 y	(56, 61)
51	<i>p</i> -Benzenesulfonic acid-azo-phenyl- α -naphthylamine	v 3.5–6.5 o	(61)
52	<i>o</i> -Carboxybenzene-azo-phenyl- α -naphthylamine	v 3.5–6.5 o	(61)
53	Benzene-azo- α -naphthylamine	r 3.7–5.0 y	(56, 61)
54	<i>p</i> -Toluene-azo- α -naphthylamine	3.7–5.0	(53, 54, 56)
55	<i>o</i> -Carboxybenzene-azo-methylaniline	r 4.0–6.0 y	(11)
56	Benzene-azo- <i>m</i> -phenylenediamine; Chrysoidine [S. 33; R. 20]	o 4.0–7.0 y	(9)
57	<i>o</i> -Carboxybenzene-azo-ethyl aniline	r 4.2–6.2 y	(11)
58	<i>o</i> -Carboxybenzene-azo- <i>n</i> -propylaniline	r 4.2–6.2 y	(11)
59	<i>o</i> -Carboxybenzene-azo-dimethylaniline; Methyl red [R. 211]	r 4.2–6.3 y	(11, 14, 56, 60)
60	<i>o</i> -Carboxybenzene-azo-diethylamine; Ethyl red	r 4.4–6.2 y	(11, 60)
61	* <i>o</i> -Carboxybenzene-azo-di- <i>n</i> -propylaniline; Propyl red	r 4.6–6.6 y	(11)
62	<i>o</i> -Carboxybenzene-azo- <i>m</i> -phenylenediamine	o 4.6–7.6 y	(9)
63	Benzene-azo-dimethyl- α -naphthylamine	4.8–5.5	(53, 54, 56)
64	<i>p</i> -Benzenesulfonic acid-azo-dimethyl- α -naphthylamine	r 5.0–5.7 o	(53, 54, 56, 61)
65	<i>o</i> -Carboxybenzene-azo- α -naphthylamine	p 5.6–7.0 y	(11)
66	<i>o</i> -Carboxybenzene-azo-(di or mono)-amyl aniline	o 5.6–7.0 y	(11)
67	<i>o</i> -Carboxybenzene-azo-dimethyl- α -naphthylamine	r 5.6–7.6 o	(11, 61)
68	4-Sulfo- α -naphthalene-azo- α -naphthol; Naphthylamine brown [S. 160; R. 175]	o 6.0–8.4 p	(9)
69	Tropaeolin?	y 7.0–9.0 r	(50)
70	6-Sulfo- α -naphthol-1-azo- <i>m</i> -hydroxybenzoic acid	{ o 7.0–8.0 b v 12–13 r }	{ (57)
71	Curcumein?	y 7.4–8.6 b	(31)
72	<i>p</i> -Benzenesulfonic acid-azo- α -naphthol; Tropaeolin OOO No. 1 [S. 144; R. 150]	y 7.6–8.9 p	(56)
73	<i>p</i> -Benzenesulfonic acid-azo- β -naphthol; Tropaeolin OOO No. 2 [S. 145; R. 151]	7.6–8.9(?)	(45)
74	<i>m</i> -Nitrobenzene-azo-salicylic acid; Alizarine yellow GG [S. 48; R. 36]	c(?) 10.0–12.0 y	(38, 39)
75	<i>p</i> -Nitrobenzene-azo-salicylic acid; Alizarine yellow R [S. 58; R. 40]	y 10.0–12.1 y	(56)
76	α -Naphthylaminosulfonic acid-azo- β -naphthol; Red I [S. 161; R. 176]	10.5–12.1	(53, 54, 56)
77	α -Naphthalene-azo- β -naphthol-3, 6-disulfonic acid; Bordeaux B [S. 112; R. 88]	p 10.5–12.5 o	(9)
78	<i>p</i> -Benzenesulfonic acid-azo-resorcinol; Tropaeolin O [S. 143; R. 148]	y 11.1–12.7 o	(56)
79	Benzene-azo- β -naphthol-6, 8-disulfonic acid; Orange GG [S. 38; R. 27]	y 11.5–14.0 p	(9)
80	Crocein?	p 12.0–14.0 v	(50)
81	Helianthin (Grübler)?	o 11.0–12.0 r	(9)
82	Helianthin I?	o 11.0–13.0 r	(50)
83	Helianthin II?	y 13.0–14.0 v	(50)
84	Curcumein?	{ o 0.0–1.0 y y 13.0–15.0 g }	{ (50)
DIS-AZO COMPOUNDS			
85	Ditolyl-disazo-bis- β -naphthylamine-6-sulfonic acid; Benzopurpurin B [S. 365; R. 450]	{ b 0.3–1.0 v v 1.0–5.0 y y 12.0–14.0 r }	{ (50)
86	Ditolyl-disazo-bis- α -naphthylamine-4-sulfonic acid; Benzopurpurin 4B [S. 363; R. 448]	v 1.3–4.0 r	(31)
87	Diphenyl-disazo-bis- α -naphthylamine-4-sulfonic acid; Congo red [S. 307; R. 370]	b 3.0–5.0 r	(50)
88	Ditolyl-disazo-bis- α -naphthol-4-sulfonic acid; Azo blue [S. 377; R. 463]	v 10.5–11.5 p	(9)
89	Curcumin W [Probably Rowe, 364 (21)]	{ mid-point 7.3 mid-point 7.6 }	{ (49) (18)

TRIPHENYLMETHANE DERIVATIVES			
Index No.	Indicator	Color and useful range pH	Lit.
90	Methylated pararosaniline; Crystal violet [S. 516; R. 681]	g 0.0- 2.0 b	(9)
91	<i>p</i> , <i>p'</i> -Tetramethyldiamino-triphenylcarbinol; Malachite green [S. 495; R. 657]	y 0.0- 2.0 g b 11.5-14.0 f	(50)
92	Hofmann's violet; Methylated rosanilines and pararosanilines [S. 514; R. 679]	g 0.0- 2.0 b	(9)
93	Tetraethyl-diamino-triphenyl-carbinol; Brilliant green [S. 499; R. 662]	y 0.0- 2.6 g	(9)
94	Heptamethylrosaniline; Iodine green [R. 686]	y 0.0- 2.6 b	(9)
95	Hexaethylpararosaniline; Ethyl violet [S. 518; R. 682]	y 0.0- 3.6 b	(9)
96	Ethyl-hexamethyl-pararosaniline; Ethyl green [R. 685]	y 0.3- 2.0 b	(31)
97	Methyl violet 6B; Benzylated tetra- and pentamethyl-pararosaniline [S. 517; R. 683]	y 0.15- 3.2 v	(56)
98	Gentian violet; mixture	0.4- 2.7	(53, 54, 56)
99	Aniline red; Rosaniline and pararosaniline [S. 512; R. 677]	pu 1.2- 3.0 f	(9)
100	Red violet 5RS; Di- and tri-sulfonate of ethylrosaniline [S. 525; R. 693]	p 3.6- 6.0 c	(9)
101	Rosazurin [R. 727 note]	o 3.8- 6.5 v	(31)
102	China blue [S. 539; R. 707]; Mixture	b 4.7- 7.0 c	(9)
103	Rosolic acid [S. 555; R. 724]; Mixture	br 6.9- 8.0 r	(56)
104	Alkali blue 4B [S. 536; R. 704]; Mixture	v 9.4-14.0 p	(9)
105	XI Soluble blue [S. 538; R. 706]; Mixture	b 10.0-13.0 p	(9)
106	Poirrier's blue	b 11.0-13.0 r	(9)
107	Acid fuchsin; Di- and tri-sulfonic acids of rosaniline and pararosaniline [S. 524; R. 692]	r 12.0-14.0 f	(50)
PHTHALEINS AND RELATED COMPOUNDS			
108	Diethyl- <i>m</i> -amino-phenolphthalein; Rhodamine B [S. 573; R. 749]	o 0.1- 1.2 p	(9)
109	Pyrogallol-phthalein; Gallein [S. 599; R. 781]	variable 0-14	(50)
110	Tetrabromofluorescein; Eosine Y S [S. 587; R. 768]	y 0 - 3.0 fl	(9)
111	Erythrosin (iodosin); Di- or tetra iodated fluorescein [S. 591, 592; R. 772, 773?]	o 0.0- 3.6 fl	(9)
112	Phloxin red B.H. (Grübler)?	p 1.4- 3.6 r	(9)
113	Dihydroxyfluoran; Uranin (fluorescein) [S. 585; R. 766]	y 3.6- 5.6 fl	(9)
114	Dichlorofluorescein	y 4.0- 6.6 fl	(9)
115	<i>o</i> - α -Naphthol phthalein	y 8.9- 9.5 g(f)	(17)
116	<i>p</i> - α -Naphthol phthalein	y 7.0- 9.0 b	(56)
117	Tetrabromophenol phthalein	c 8.0- 9.0 v	(45)
118	<i>o</i> -Cresoltetrachlorophthalein	c 8.5- 9.0 pu	(1)
119	<i>o</i> -Cresolphthalein	c 8.2- 9.8 r	(11, 14)
120	Phenolphthalein [R. 764]	c 8.3-10.0 r	(38, 39, 56)
121	*1, 2, 3-Xylenolphthalein	c 8.9-10.2 b	(17)
122	Thymolphthalein	c 9.3-10.5 b(f)	(56)
123	Dibromo-dinitrofluorescein; Eosin BN [S. 590; R. 771]	p 10.5-14.0 y	(9)
124	R = SC ₆ H ₅	c 8.4-10.0 v	(25)
125	R = SC ₆ H ₄	c 8.6- 9.8 v	(25)
126	R = SC ₆ H ₃	c 9.0-10.0 v	(25)
SULFONPHTHALEINS			
127	Catecholsulfonphthalein	p 0.2- 0.8 o y 4.0- 7.0 g v 8.5-10.2 b	(41)
128	<i>m</i> -Cresolsulfonphthalein; Metacresol purple	r 0.8- 2.4 y y 7.6- 9.2 pu	(11, 14)
129	Thymolsulfonphthalein; Thymol blue	r 1.2- 2.8 y y 8.0- 9.6 b	(11, 14)
130	Tetranitrophenolsulfonphthalein	2.8- 3.8?	(11)
131	Tetrabromophenolsulfonphthalein; Bromphenol blue	y 3.0- 4.6 b	(11, 14)
132	*Tetrachlorophenolsulfonphthalein	y 3.0- 4.6 b	(11)
133	*Dichloro-dibromo-phenol-sulfonphthalein; Brom-chlorphenol blue	y 3.2- 4.8 b	(14)
134	Tetrabromo- <i>m</i> -cresolsulfonphthalein; Bromeresol green	y 3.8- 5.4 b	(11, 14)
135	Dichlorophenolsulfonphthalein; Chlorphenol red	y 5.0- 6.6 r	(11, 14)
136	Dibromo- <i>o</i> -cresolsulfonphthalein; Bromeresol purple	y 5.2- 6.8 pu	(11, 14)
137	Dibromophenolsulfonphthalein; Bromphenol red	y 5.4- 7.0 r	(11, 14)
138	*Diiodophenolsulfonphthalein	y 5.7- 7.3 pu	(9)
139	Dibromothymolsulfonphthalein; Bromthymol blue	y 6.0- 7.6 b	(11, 14)
140	*Brom Xylenol Blue, dibrominated No. 145	y 6.0- 7.6 b	(11, 14)
141	Phenol-nitrosulfonphthalein	y 6.6- 8.4 pu	(11)

SULFONPHTHALEINS.—(Continued)

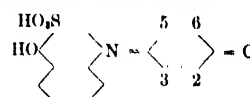
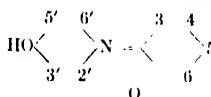
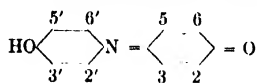
Index No.	Indicator	Color and useful range pH	Lit.
142	Phenolsulfonphthalein; Phenol red	y 6.8-8.4 r	(11, 14)
143	o-Cresolsulfonphthalein; Cresol red	y 7.2-8.8 r	(11, 14)
144	Salicylsulfonphthalein	y 7.2-9.2 p	(9)
145	*1,4-Dimethyl-5-hydroxybenzenesulfonphthalein; Xylenol blue	y 8.0-9.6 b	(12)
146	α-Naphtholsulfonphthalein	y 7.5-9.0 b	(11)
147	Carvacrolsulfonphthalein	y 7.8-9.0 b	(11)
148	Oreinsulfonphthalein	y 8.0-10.0 fl	(11)
149	Nitro-thymolsulfonphthalein	v 9.2-11.5 y	(11)

QUINOLINE COMPOUNDS

150	α-(p-Dimethylaminophenylethylene)-quinoline ethiodide; Quinaldine red. Eastman Kodak Co. No. 1361	1 0 2 0	(36)
151	Quinoline blue (cyanin); 1, 1' Disoamyl-4, 4'-quinoxaline iodide [S. 611; R. 806]	e 7 0 8 0 v	(52, 54, 56)

Index No. 152 INDOPHENOLS (15)

Color changes: from brownish or clear red in acid to deep blue in alkali. All indophenols are somewhat unstable



Indophenol		Orthoindophenol		Indonaphthol-2'-sulfonic acid	
Substituents	pK	Substituents	pK	Substituents	pK
2, 6, 3' Tribromo-	5.1	3' Bromo-	7.1	2, 6 Dichloro-	6.1
2, 6-Dibromo-3'-chloro-	5.4	Orthoindophenol	8.4	Indonaphthol-2'-sulfonic acid	8.7
2, 6-Dibromo-3'-methyl-	5.4	2'-Methyl-	8.8	2-Methyl-	9.0
2, 6-Dichloro-3'-chloro-	5.8				
2, 6-Dichloro-3'-methyl-	5.5				
2, 6-Dibromo-3'-methoxy-	5.6				
2, 6-Dichloro-	5.7				
2, 6-Dibromo-	5.7				
2, 6-Dibromo-2'-methyl-	5.9				
2, 6-Dibromo-2'-bromo-	6.3				
2-Chloro-	7.0				
2-Bromo-	7.1				
3-Bromo-	7.8				
Indophenol	8.1				
2-Methyl-	8.4				
3-Methyl-	8.6				
2-Methoxy-	8.7				
2-Isopropyl-5-methyl-	8.8				
2-Methyl-5-isopropyl	8.9				

AZINES

Index No.	Indicator	Color and useful range pH	Lit.
153	Safranine (Which?)	b-0 3-1 0 r	(50)
154	Amino-dimethylamino-phenyl-diphenazonium chloride; Methylene violet B.N. [S. 680; R. 842]	pu 0 0-1 2 v	(9)
155	Amino-phenylamino-p-tolyl-ditolazonium sulphate; Mauve [S. 688; R. 846]	0 1 2 9	(56)
156	Magdala red; Mixture amino- and diamino-naphthyl-dinaphthazonium chlorides [S. 694; R. 857]	p 3 0-4 0 fl	(50)
157	Induline, spirit soluble [S. 697; R. 860]; Mixture	b 5 0-7 0 v	(9)
158	Amino-dimethylamino-toluphenazonium chloride; Neutral red [S. 670; R. 825]	r 6 8-8 0 y	(56)
159	Dimethylamino-phenyl-naphtho-phenazonium chloride; Neutral blue [S. 676; R. 832]	9 3-10 2	(52, 54, 56)

OXAZINE COMPOUNDS

160	Dihydroxy-dinaphthazonium sulfonate; Alizarin green B [S. 657; R. 918]	v-0 3-1 0 p	(50)
161	Diethylamino-benzylamino-naphtho-phenazonium chloride; Nile blue 2B [S. 654; R. 914]	y 12 0-14 0 br	(9)
162	Diethylamino-aminonaphtho-phenazonium sulfate; Nile blue A [S. 653; R. 913]	b 7 2-8 0 p	(9)
		b 10 2-13 0 p	(9)

ANTHRAQUINONE COMPOUNDS

Index No.	Indicator	Color and useful range pH	Lit.
163	1, 2-Dihydroxy-anthraquinone- β -quinoline; Alizarin blue ABI [S. 803; R. 1066]	p 0.0- 1.6 y y 6.0- 7.6 g	(9)
164	1, 2, 4-Trihydroxy-anthraquinone; Purpurin [S. 783; R. 1037]	y 0.0- 4.0 o o 4.0- 8.0 p	(9)
165	Alizarin sulfonic acid; Alizarin red S [S. 780; R. 1034]	y 3.7- 4.2 p	(67)
166	1, 2-Dihydroxy-anthraquinone; Alizarin [S. 778; R. 1027]	y 5.5- 6.8 r v 10.1-12.1 pu	(53, 54, 56)
167	Alizarin blue S	various 6-14	(45)

INDIGOS

168	Indigo disulfonate; Indigo carmine [S. 877; R. 1180]	b 11.6-14.0 y	(9)
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MISCELLANEOUS AND NATURAL INDICATORS

169	Echtrot?	y 0 - 1.0 r	(50)
170	Logwood [S. 938; R. 1246]	various 0-14	(45)
171	*Red cabbage extract	r 2.4- 4.5 g	(66)
172	1-Oxynaphtho-quinomethane; Nierenstein's indicator	e 2.7- 3.7 pu	(67)
173	Tröger and Hille's Indicator, $C_{14}H_{15}N_3SO_3H$	o 2.8- 3.9 y	(67)
174	Phenacetolm	y 3.0- 6.0 r r 10.0-13.0 e	(45)
175	Laemosol	r 4.4- 5.5 b	(26)
176	Laemond [R. 908 note]	r 4.4- 6.2 b	(53, 54, 56)
177	Azolitmin (litmus) [R. 1242]	r 4.5- 8.3 b	(53, 54, 56)
178	Cochineal [S. 932; R. 1239]	y 4.8- 6.2 v	(53, 54, 56)
179	Archil (orchil) [S. 934; R. 1242]	p 5.6- 7.6 v	(9)
180	Brazilein [S. 935; R. 1243]	e 6.0- 8.0 p	(9)
181	Di- <i>o</i> -hydroxy-styryl ketone; Lygosme	y 7.3- 8.7 g	(67)
182	Mimosa flower extract	7.7- 9.6	(67)
183	Turmeric (curcuma) [S. 927; R. 1238]	y 7.8- 9.2 br	(31)
184	Alkannin [R. 1240, note] cf. alizarin	8.3-10.0	(53, 54, 56)
185	α -Naphthalbenzein	y 8.5- 9.8 g	(53, 54, 56)

COMMON SYNONYMS OF INDICATORS

Among synonyms given in this table are several which apply to dyes which are not listed in preceding table or which have been applied to two or more of the indicators listed. Such cases are indicated by *.

Acid bordeaux, 77	Azolitmin, 177
Acid brown R, * 68	Azoreosin, 101
Acid fuchsin, * 107	Benzopurpurin B, 85
Acid magenta 11, 107	Benzopurpurin 4B, 86
Acid roseine, 107	Benzyl violet, 97
Alizarin, 166	Beta naphthol orange, 73
Alizarin blue ABI, 163	Bitter almond oil green, 91
Alizarin blue S, 167	Blauholz, 170
Alizarin blue X, 163	Boettger's indicator, 184
Alizarin carmine, 165	Bordeaux B, 77
Alizarin green B, 160	Brazilein, braasin, brazilin, 180
Alizarin red S, 163	Brazil wood, 180
Alizarin sulfonate or S, 165	Brilliant green, 93
Alizarin yellow GG, 71	Brilliant yellow, * 89
Alizarin yellow R, 75	Brom-chlor-phenol blue, 133
Alkali blue 4B, 164	Brom cresol green, 131
Alkanet, 184	Brom cresol purple, 136
Alkann, Alkanna, 184	Brom phenol blue, 131
Alphanaphtholbenzene, 185	Brom phenol red, 137
Alphanaphtholphthalein, * 116	Brom thymol blue, 139
Amido-azo-benzol, 30	Brom xylenol blue, 140
Amido-azo-toluid, 26	Butter yellow, * 26, 37
Amino-azo-benzene, 30	Cabbage red, 171
Amino-azo-toluene, 26	Campeachy wood, 170
Amyl red, 66	Caramine, 178
Anchusin, 184	Carminic acid, 178
Aniline orange, * 31	Catechol sulphonphthalein, 127
Aniline red, 90	China blue, 102
Aniline yellow, * 3, 25, 30	Chlor phenol red, 135
Archil, 179	Chrome printing orange R, 75
Aurin, 103	Chrome printing yellow G, 74
Azo blue, 88	Chrysoidine, * 56

Chrysoine, 78	Eosine YS, 110
Cocceus, 178	Erythrosine, * 111
Cochineal, cochineal, 178	Ethyl green, * 96
Congo, 87	Ethyl orange, 45
Congo red, 87	Ethyl red, * 60
Corallin, 103	Ethyl violet, 95
Cresol red, 143	Fast red A, 76
Cresolphthalein, * 119	Fast red B, * 77
Cresolsulphonphthalein, * 143	Fluorescein, 113
Crismer's indicator, 101	Formanek's indicator, 160
Crocein, * 80	Fuchsin, 154
Crystal violet, 90	Fuchsin, * 99
Curcuma, 183	Fuchsin S, 107
Currenmin, * 84	Galeine, 109
Curcumin, * 183	Gallen, 109
Curcumin W, 80	Gentian violet, 98
Currenmin, * 183	Golden orange, 44
Cyamin, 151	Haematein, * 170
Dechan's indicator, 109	Haematoxylin, * 1 haematoxylin, * 170
Degenor's indicator, 174	Helianthine, * 41, 81, 82, 83
Diam red, * 87	Hematein, * 1 hemine, * 170
Dichlorofluorescein, 114	Hematoxylin, * 1 170
Diethylamine orange, 45	Henderson & Forbes' indicator, 5
Dihydroxyanthraquinone, 166	Herzberg's indicator, 87
Dimethylaniline orange, 44	Hofmann's violet, 92
Dimethyl orange, 44	Holt & Reid's indicators, 124-126
Dimethyl yellow, 37	Indigo carmine, 168
Dinitroaminophenol, 9	Indigo disulphonate, 168
Dinitrohydroquinone, 5	Indophenol, 152
Echtrot, * 169	Induline spirit-soluble, 157
Echtrot A, 76	Iodeosine, * 111
Echtrot B, 77	Iopieramic acid, 9
Eosine, 110	Iodine green, 94
Eosine BN, 123	Kosmos red, 87

* Haematoxylin is the leuco-compound of Haematein or Hematine as obtained from logwood although the name is sometimes given to the oxidized form. Haematein or Hematine should not be confused with Hematin of the blood pigment.

Kroupa's indicator, 99
 Krüger's indicator, 113
 Lackmoid, lacmoid, 176
 Lactosol, 175
 Lactus, 177
 Latmus, 177
 Logwood, 170
 Luck's indicator, 120
 Lunge's indicator, 44
 Lygosine, 181
 McClendon's indicator, 11
 Magdala red, 156
 Magenta,* 99
 Malachite green, 91
 Manchester yellow, 3
 Martius yellow, 3
 Mauve, mauveine, 155
 Mellet's indicator, 70
 Meta cresol purple, 128
 Meta methyl red, 33
 Metanil yellow, 23
 Metanitrophenol, 15
 Methyl blue,* 105
 Methylene violet BN, 154
 Methyl green,* 96
 Methyl orange, 41
 Methyl red, 59
 Methyl violet 5B or 6B, 97
 Methyl yellow, 37
 Michael's nitro indicators, 1, 2, 4, 7, 8, 10, 12, 15
 Mimosa flower extract, 182
 Mor's "Improved methyl orange," 40
 Mor's polychromatic indicator, 127
 Monobenzyl orange, 32
 Monoethyl orange, 43
 Monoethyl red, 57
 Monomethyl orange, 42
 Monomethyl red, 55
 Monopropyl red, 58
 Naphthol benzene, 185
 Naphthol orange, 72
 Naphtholphthalein,* 115, 116
 Naphthylamine brown, 68
 Neutral blue, 159
 Neutral red, 158
 Nierenstein's indicator, 172
 Nile blue A, 162
 Nile blue B, 161
 Nitramine, 16
 Nitroaminoguanicol, 11
 Nitrobenzene (tri), 17
 Nitrobenzoylene urea, 14
 Nitronaphthol, 3
 Nitrotoluene, 18
 Oil yellow,* 37
 Oil yellow B, 30
 Orange G,* 79
 Orange GG, 79
 Orange I, 72
 Orange II, 73
 Orange III,* 36, 44
 Orange IV, 25
 Orchi, 179
 Orseille, 179
 Parahelianthine, 44
 Para methyl red, 20
 Paranitrophenol, 12
 Paraphthalein, 120
 Pernambuco, 180
 Phenacetol, 174
 Phenol red, 142
 Phenolphthalein, 120
 Phenolphosphthalein, 142
 Phloxin red BH, 112
 Phosphine substitute, 78
 Picric acid, 1
 Poirrier's blue C4B, 106
 Poirner's orange III, 44
 Propyl red, 61
 Purpurn, 164
 Pyrogallol phthalein, 109
 Quinaldine red, 150
 Quinoline blue, 151
 Red I, 76
 Red cabbage extract, 171
 Red violet 5R,* 92
 Red violet 5RS, 100
 Red wood, 180
 Resaurin, 101
 Resorcin blue,* 176
 Resorcin phthalein, 113
 Resorcin yellow, 78
 Rhodamine B, 108
 Riegel's indicator, 87
 Rosaniline, 99
 Roseine, 99
 Rose magdala, 156
 Rosolane, 155
 Rosolic acid, 103
 Rothols, 180
 Rubine S, 107
 Safranine,* 153
 Saccyl yellow,* 74
 Schaal's indicator, 106
 Soluble blue 3M, 2R, 102
 Soluble red woods, 180
 Spirit yellow, 30
 Spirit yellow G, 30
 Spirit yellow R, 26
 Tetra brom fluorescein, 110
 T. N. T., 18
 Thymol blue, 129
 Thymolphthalein, 122
 Toluidine orange* (ortho), 39
 Toluidine orange* (meta), 47
 Toluidine red,* 158
 Töpfer's reagent, 37
 Tournesol, 177
 Troger and Hille's indicator, 173
 Tropaeolin*,? 69
 Tropaeolin D, 44
 Tropaeolin G,* 23, 72
 Tropaeolin O, 78
 Tropaeolin OO, 25
 Tropaeolin OOO No 1, 72
 Tropaeolin OOO No 2, 73
 Tropaeolin R, 78
 Turmeric, 183
 Turnsole, 177
 Uranin, 113
 von Müller's indicator?, 25
 Weselky's indicator, 101
 Water blue, 102
 XL Soluble blue, 105
 Xylenol blue, 145
 Xylenol phthalein,* 121
 Xylidine orange* (meta), 40
 Xylidine orange* (para), 18
 Yellow B, 37
 Yellow T, 78
 Zellner's indicator, 113

TABLE 3

A. CLARK AND LUBS' SELECTION OF INDICATORS SUPPLEMENTED BY COHEN (11, 14)

A = Cubic centimeters of 0.01N NaOH required per 0.1 g acid indicator to form sodium salt. Dilute to 250 cc for 0.04 % reagent. Use alcoholic solutions of methyl red (59) and cresolphthalein (110).

B = Approximate pH value of solution required for full "acid color" appertaining to range indicated

C = Approximate pH value of solution required for full "alkaline color" appertaining to range indicated

Index No.	A	B	C	Useful range pH	pK†
129	see below conc. HCl	6	6	1 2 2 8	1.5
131	15 0	0	7	3 0 4 6	4.0
134	14 5	1	8	4 0 5 6	4.7*
59		?	9	4 4 6 0	[5.0]
135	23 5	3	10	5 0 6 6	6.2*
136	18 5	3	10	5 2-6 8	6.3
139	16 0	4	10	6 0 7 6	7.1
142	28 5	5	11	6 8-8 4	7.8
143	26 3	5	11	7 2-8 8	8.2
128	26 5	5	11	7 6 9 2	8.4*
129	21 5	6	12	8 0 9 6	8.9
119		6	12	8 2 9 8	[9.4]

* No salt and protein errors determined

† pK values are weighted means of values found in (2, 7, 11, 14, 19, 20, 24, 24).

Representative Corrections of Colorimetric Readings with Indicators of Table 3.4 to Bring Readings to Electrometric pH

	Peptone-beef infusion	10% gelatine sol.	2% egg-white	Urine
131 Brom phenol blue.	0 05			
59 Methyl red	-0 10		0 24	0.05
136 Brom cresol purple.	0 01	0 04		0.01
139 Brom thymol blue	0 10	0 04		0.02
142 Phenol red	0 04	0 20		0.00
143 Cresol red	0 03	0 20		
129 Thymol blue	0 04	0 20		
119 Cresolphthalein	-0 03	0 20		

Corrections at different salt content [after Kolthoff (29)]

Thymol blue (acid range) 0.1N KCl	-0.06
1.0N KCl	+0.05
Brom phenol blue 0.1N KCl	-0.05
1.0N KCl	-0.35
Methyl red 0.5N NaCl	+0.10
Brom cresol purple 0.5N NaCl	-0.25
Phenol red 0.5N NaCl	-0.15
Thymol blue 0.5N NaCl	-0.17

With color match between a solution at 70° and a standard buffer at 20° the solution at 70° will have the pH of the standard corrected by the following values according to Kolthoff (29).

Thymol blue (acid range)	0.0
Brom phenol blue	0.0
Methyl red	-0.2
Brom cresol purple	0.0 to +0.2
Phenol red	-0.3
Thymol blue (alk.)	-0.4

Corrections in sea water of salinity 8 [parts per 1000] after Ramage and Miller 1925 (unpublished).

S.....	5	10	15	20	25	30	35
Cresol red..	-11	-17	-21	-24	-25	-26	-27

INTERNATIONAL CRITICAL TABLES

B. SØRENSEN'S SELECTION OF INDICATORS (56)

Index No.	Composition of test solution	Useful range pH	Sensitivity to neutral salts	Usefulness in presence of			Stability on standing
				True proteins	High conc. of products of proteolysis	Chloroform and toluene	
97	0.01%-0.05% aqueous	0 1-3 2	high	fair	good	with chloroform not, with toluene useful as above	acid solutions fade
155	0.01%-0.05% aqueous	0 1-2 9	high	fair	good	as above	as above
22	0.01 g in 1 cc N HCl + 50 cc alcohol + 49 cc water	1 2 2 1	low	not	fair	not	moderate
25	0.01% aqueous	1 4-2 6	low	not	fair	good	good
23	0.01% aqueous	1 2-2 3	low	not	fair	good	good
34	0.02 g in 1 cc N/10 HCl + 50 cc alcohol + 49 cc water	2 3 3 3	low	not	good	not	moderate
32	0.01% aqueous	1 9 3 3	low	not	fair	good	good
35	0.01% aqueous	2 6-4 0	low	not	fair	good	good
37	0.01 g 0.1 cc N/10 HCl + 80 cc alcohol + 20 cc water	2 9-4 0	low	not	good	not	moderate
44	0.01% aqueous	3 1-4 4*	low	not	fair	good	good
53	0.01 g in 0.4 cc N/10 HCl + 30 cc alcohol + 70 cc water	3 7-5 0	low	not	good	not	moderate
50	0.01 g in 60 cc alcohol + 40 cc water	3 5 5 7	low	not	good	good	good
59	0.02 g in 60 cc alcohol + 40 cc water	4 2 6 3*	low	S.C.	good	good	moderate
12	0.04 g in 6 cc alcohol + 94 cc water	5 0-7 0*	moderate	good	good	good	good
158	0.01 g in 50 cc alcohol + 50 cc water	6 8-8 0*	low	S.C.	good	S.C.	good
103	0.04 g in 40 cc alcohol + 60 cc water	6 9 8 0	low	fair	good	fair	good
72	0.01% aqueous	7 6-8 9	low	good	good	good	good
116	0.1 g in 150 cc alcohol + 100 cc water	7 3 8 7	moderate	S.C.	good	good	fair
120	0.05 g in 50 cc alcohol + 50 cc water	8 3-10 0*	moderate	S.C.	good	good	good—fades in strong alkali
122	0.04 g in 50 cc alcohol + 50 cc water	9 3-10 5	moderate	S.C.	good	good	fades in moderate alkali
75	0.01% aqueous	10 1 12 1			good		good
78	0.01% aqueous	11 1-12 7			fair		good

S.C. = useful in special cases

* Apparent pK values referred to standard buffers: Methyl orange (44) 3.7 (24 cf 60), Methyl red (59) see Table 3A (58, 60), Paranitrophenol (12) see Table 3C, Neutral red (158) 6.85 (24), Phenolphthalein see Table 3C.

Representative average corrections of colorimetric readings with indicators of Table 3B to bring readings to electrometric pH (see also Table 2).

Index No. of indicator	Corrections (after Sørensen (53))		Corrections in solutions containing salts
	In 2% peptone 0.01-0.3N salt	In 2% egg-white 0.07-0.3N salt	
97	-0.02	-0.19	
155	-0.04	-0.19	
22	-0.06	> -0.90	
25	-0.27	> -1.40	
23	-0.30	> -1.40	
34	+0.01	> -0.80	
32	-0.22	> -0.80	
35	-0.41		
37	-0.08	-0.53	
44	-0.18		0.1N KCl, -0.08; 1.0N KCl, +0.23 Kolthoff
53	-0.02		
50	-0.03	+0.15	0.5N NaCl, +0.10 Sørensen
12	-0.06	-0.04	0.5N NaCl, -0.15 Sørensen (-0.05 Kolthoff)
158	+0.13	+0.68	0.5N NaCl, +0.09 Sørensen

Index No. of indicator	Corrections (after Sørensen (53))		Corrections in solutions containing salts
	In 2% peptone 0.01-0.3N salt	In 2% egg-white 0.07-0.3N salt	
103	+0.08	+0.44	0.5N NaCl, -0.06 Sørensen
72	-0.12	+0.10	0.5N NaCl, -0.12 Sørensen
120	-0.01	+0.18	0.5N NaCl, -0.12 Sørensen (-0.17 Kolthoff)
122	+0.01	+0.40	
75		+0.29	
78		-0.30	0.1N KCl, +0.38; 1.0N KCl, +0.62 Kolthoff

C. MICHAELIS' SELECTION OF ONE-COLOR INDICATORS

Index No.	Useful range pH	Conc. % in H ₂ O	pK (Michaelis and coworkers (38, 39))			pK (Kolthoff (31) at 15° and 0.05M salt)
			In low salt content	In 0.15M salt	In 0.5M salt	
1	0.03-1.3		[0.26]			
2	2.0-4.0	sat.	3.71 + 0.006 (15 - t°)	3.59	3.41	3.58

C. MICHAELIS' SELECTION OF ONE-COLOR INDICATORS.—(Continued)

Index No.	Useful range pH	Conc. % in H ₂ O	pK (Michaelis and coworkers (38, 39))			pK (Kolthoff (31) at 15° and 0.05M salt)
			In low salt content	In 0.15M salt	In 0.5M salt	
4	2.6-4.4	0.05	4.08 + 0.009 (15 - t°)	3.98	3.88	3.95
7			4.87	4.76	4.71	
8	4.0-5.8	0.025	5.16 + 0.005 (15 - t°)	5.08	5.01	5.15
10			5.35	5.30	5.25	
12	5.6-7.6	0.10	7.22 + 0.011 (15 - t°)	7.22	7.17	7.03
15	6.8-8.6	0.30	8.35 + 0.008 (15 - t°)	8.24	8.19	8.30
120	8.0-10.0	0.04	[9.76] + 0.011 (18 - t°)	9.6	9.5	
74	10.0-12.0		[11.2] + 0.013 (20 - t°)			

TABLE 4

RELATION BETWEEN PERCENTAGE, A, OF AVAILABLE COLOR AND PH (AFTER MICHAELIS AND GYEMANT (38))

Phenolphthalein..	18°	a	1	0	1	4	3	0	4	7	6	9	0
		pH	8	4	5	8	5	8	6	8	7	8	8
Phenolphthalein	18°	a	12	0	16	0	21	0	27	0	34	0	40
		pH	9	0	9	1	9	2	9	3	9	4	9
Phenolphthalein	18°	a	45	0	50	0	55	0	60	0	65	0	
		pH	9	6	9	7	9	8	9	9	10	0	
Phenolphthalein	18°	a	70	0	75	0	80	0	84	5	87	3	
		pH	10	1	10.2	10	3	10	4	10	5		
Alizarine yellow GG.	20°	a	13	16	22	29	36	46					
		pH	10	0	10	2	10.4	10.6	10.8	11	0		

HIGH VACUUM TECHNIQUE

SAUL DUSHMAN

SELECTED FORMULAE

 1. Amount of Gas Striking 1 Cm² per Sec—

$$m = \frac{1}{4} \rho \Omega = p \sqrt{\frac{M}{2\pi RT}}$$

 where ρ = density and Ω = average velocity

$$= 43.74 \times 10^{-6} \times p \sqrt{M/T} \text{ g cm}^{-2} \text{ sec}^{-1} \text{ (p in barres)}$$

$$= 58.32 \times 10^{-3} \times p \sqrt{M/T} \text{ g cm}^{-2} \text{ sec}^{-1} \text{ (p in mm of Hg)}$$

 n = number of molecules

$$= 6.062 \times 10^{23} \frac{m}{M} = 2.653 \times 10^{15} \frac{p}{\sqrt{MT}} \text{ cm}^{-2} \text{ sec}^{-1} \text{ (p in barres)}$$

$$= 3.535 \times 10^{22} \frac{p}{\sqrt{MT}} \text{ cm}^{-2} \text{ sec}^{-1} \text{ (p in mm of Hg)}$$

 2. Laws of Molecular Flow (Flow of Gases at Very Low Pressures).— Q = amount of gas flowing through any tube or opening in cm³ per sec

$$= \frac{p_2 - p_1}{W \sqrt{\rho_1}}$$

 where $p_2 - p_1$ = difference of pressure

 ρ_1 = density at 1 barye pressure

$$= 83.15 \times 10^{-7} T$$

 Alizarine yellow GG. 20° a 56 66 75 83 88
pH 11 2 11 4 11 6 11 8 12.0

LITERATURE

(For a key to the periodicals see end of volume)

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 W = "resistance" of tube or opening

 For a circular opening (diam., d cm) in a thin plate

$$W = \frac{3.184}{d^2}$$

 For a tube of diameter d and length l

$$W = \frac{2.394l}{d^3} + \frac{3.184}{d^2}$$

 3. Speed of Exhaust (S) of Given Volume (v).—

$$S = \frac{v}{t} \log_e \frac{p_2}{p_1}$$

 For $p_2/p_1 = 10$, t in sec and v in cm³

$$S = \frac{2.303v}{t} \text{ cm}^3 \text{ sec}^{-1}$$

For pump exhausting through resistance

$$\frac{1}{S_o} = \frac{1}{S_p} + \frac{1}{F}$$

 where S_o = observed speed of exhaust,

 S_p = speed of pump through negligible resistance, and

 F = rate of flow through resistance (cm³/sec)

$$S = \frac{Q}{p_2 - p_1} = \frac{1}{W \sqrt{\rho_1}}$$

TABLE OF MOLECULAR DATA

	H ₂	He	N ₂	O ₂	A	Hg	CO	CO ₂	H ₂ O
Mean Free path (cm) at 25°C and 1 barye.	19.2	29.6	10.0	10.7	10.6	[3.24]*	9.92	6.68	[6.03]*
(1/d ²) × 10 ⁻¹⁸ (Number of molecules per cm ³)	1.74	2.74	1.01	1.11	1.19	1.11	0.98	0.92	1.19
Micrograms (10 ⁻⁴ g) of gas striking 1 cm ² per sec at 25°C and 1 barye.	3.597	5.062	13.42	14.33	16.01	35.89	13.42	16.81	10.76
Number of molecules striking 1 cm ² per sec at 25°C and 1 barye. Unit = 10 ¹⁸	1082	769.3	283.7	271.7	243.3	10.85	283.7	231.7	362.0

* Values in square brackets refer to 0°C. Note: 1 barye = 0.75 × 10⁻³ mm mercury. Values of mean free path calculated from viscosity coefficients

RATE OF FLOW OF AIR AND HYDROGEN AT LOW PRESSURES AND 20°C

<i>l</i>	<i>d</i>	<i>W</i>	<i>F</i> (air)	<i>F</i> (H ₂)
1 cm	1 cm	5.58	5.204	197.10
10	1	27.12	1.070	40.53
1	0.1	2.7124	10.70	40.53
10	0.1	24.258	1.196	3.60

(Note.—These relations are valid only for pressures so low that the mean free path is equal to or greater than *d*.)

DATA ON VARIOUS TYPES OF PUMPS

	<i>S_p</i> cm ³ sec ⁻¹	Fore pump pressure	Min. pressure attainable
Gaede rotary mercury	100 (max.)	ca. 1 cm	10 ⁻⁴ mm
Gaede molecular	1.400	0.01 mm	<10 ⁻⁶ mm
Gaede diffusion	80	0.01 mm	<10 ⁻⁶ mm
Langmuir condensation (metal) . .	4.000	0.01 mm	<10 ⁻⁶ mm
Gaede two stage metal	60.000	20 mm	<10 ⁻⁶ mm

Evolution of Gas from Glass.—For rate at which gas is evolved at different temperatures, v. R. G. Sherwood (*I*, 40:1645; 18) and J. E. Shrader (*2*, 13:434; 19).

Chemical Clean-up Reagents for Producing Low Pressures.—1. Charcoal in liquid air. 2. Ca or Mg volatilized in sealed-off device, cleans up all gases except those of group 0. 3. P₂O₅, efficient for water vapor. 4. Palladium black at low temperatures, very good for hydrogen.

SOME VAPOR PRESSURES AT LOW TEMPERATURES

Substance	<i>t</i> °C	<i>p</i> , mm	<i>p</i> , baryes
Hg	-78	3 × 10 ⁻³	4 × 10 ⁻⁴
H ₂ O	-111	0.75 × 10 ⁻³	1 × 10 ⁻³
CO ₂	-182	0.75 × 10 ⁻³	1 × 10 ⁻³
CO ₂	-193	0.75 × 10 ⁻⁴	1 × 10 ⁻³
CO	-190	863	
CH ₄	-185.8	79.8	
C ₂ H ₄	-188	0.076	
C ₂ H ₆	-180	0.076	
Vaseline (Stopcock grease)	-190 (fresh liquid air)		<10 ⁻⁴

PSYCHOLOGICAL DATA PERTAINING TO ERRORS OF OBSERVATION

R. S. WOODWORTH

(Additional data pertaining to sight and hearing are given in other sections of International Critical Tables treating of the mechanical equivalent of light, colorimetry, and the physical aspects of audition. Consult index. Editor.)

SIGHT

Much of the available data pertaining to the sensitivity of the eye have been obtained under such conditions that the exact value of the stimulus cannot satisfactorily be determined. Some are expressed in terms of the illumination, others in terms of the brightness, of a screen; the latter procedure is to be preferred. If the illuminated screen were a perfect diffuser of the light, and also a perfect reflector, if illuminated from the front, or a perfect transmitter, if illuminated from the rear, then its brightness (*B*) expressed in millilamberts would be numerically equal to 0.1 of its illumination (*I*) expressed in meter-candles. In the following data, this relation has been used to reduce to the basis of *B*, data which have been given in terms of *I*. Although in many cases the screens surely did not possess the properties thus assumed, it seems probable that the error so introduced is of less importance than those arising from other sources. Data for reaction times will be found near the end of this report.

Spectral range (⁴¹) for daylight vision is $\lambda = 397\text{m}\mu$ to $760\text{m}\mu$; for twilight vision (illumination too low for color perception), $\lambda = 440\text{m}\mu$ to $670\text{m}\mu$.

Threshold value = minimum stimulus which can be visually perceived as light; the perception of form is not involved. For

white light and a thoroughly light-adapted eye, luminous area subtending an angle of 10°, it is that corresponding to a brightness of 0.1 millilambert (³⁷). For white light and a dark-adapted eye, it varies with the area of the luminous area and with the duration of stimulus as shown in Table 1.

TABLE 1.—THRESHOLD OF VISION FOR DARK-ADAPTED EYE (⁴⁵)

D = distance; θ = visual angle subtended by shortest dimension of area; *B* = brightness required for perception; *P* = power entering eye; *t* = duration of exposure. Diameter of pupil = 8.3 mm.

Unit of: Area = 1 cm²; *D* = 1 cm; *B* = 1 microlambert; *P* = 1 milliwatt = 10⁻¹⁰ erg sec⁻¹; *t* = 1 sec.

Form	Area	<i>D</i>	θ	<i>B</i>	<i>P</i>	<i>t</i>	<i>B</i> †
Star* . .	0.00785	300	1° 2'	7.20	17.1	0.002	0.362
Star* . .	0.00785	150	2.30	2.60	24.8	0.006	0.098
Star* . .	0.00785	35	9.8	0.24	42.1	0.011	0.0446
Square . .	0.04	35	19.6	0.0283	25.3	0.020	0.0239
Square . .	0.25	35	50	0.00662	37	0.034	0.0123
Square . .	1.00	35	1° 30'	0.00241	54	0.160	0.0071
Square . .	4.00	35	3.16	0.00102	91	0.250	0.0051
Square . .	9.00	35	4.54	0.00045	91	0.500	0.00354
Square . .	36.0	35	9.44	0.000258	208	1.000	0.00262
Square . .	144.0	35	18.56	0.000175	564	2.000	0.00077

* Circle, Diameter = 1 mm

† If *t* = ∞, *B* = 0.00045; *t* = 4, *B* = 0.00063

‡ For square, area = 9 cm², *D* = 35 cm, θ = 4.9°.

TABLE 2.—CHANGE IN THRESHOLD DURING ADAPTATION

Threshold = brightness (B) of a surface which can just be seen. Sensitivity (S) = $1/B$. In light adaptation, I = illumination to which dark adapted eye subjected for the time t ; S was measured 10 sec after this exposure. Unit of I = 1 min; B = 1 microlambert; S = 0.1 millilambert⁻¹, I = meter-candle.

(1) Dark adaptation (28)			(2) Light adaptation (28, 38)			
t	B	S	I	S	S	Day
0	100	1		23 000	9950	5800
0.5	5.0	20		17 500	7440	3700
4	1.33	73	1	10 400	5200	3250
9	0.54	1850	2	8130	3360	2600
14	0.0066	10 400	3	5200	2740	2038
19	0.0038	26 000	6	3470	2040	1900
23	0.001 43	69 500	10	3000	1450	1130
26	0.001 56	94 700	15		1000	312
31	0.000 57	174 000	60		95	36
39	0.000 51	195 000	80		54	28
51	0.000 48	208 000	110		54	24
61	0.000 46	215 000				

* Following nearly complete light adaptation. Luminous surface was 10 cm in diameter and 57 cm from eye ($\theta = 10^\circ$).
 † Following nearly complete dark adaptation. Luminous surface was 1 m square and 1 m from eye ($\theta = 45^\circ$); initial S , just before exposure to I , was 10 000 millilambert⁻¹.
 ‡ Moderate diffused day-light.

The rates of adaptation to darkness and to light are indicated in Table 2 in which are given the threshold values at various intervals (1) after removal from daylight, and (2) immediately (10 seconds) after removal from a specified exposure, the eye before exposure having been kept in darkness for 45 min. The visibility of monochromatic light varies with the wave-length, and the relative visibility of lights of different wave-lengths depends upon their intensities. (Figs. 1, 2.) For a large surface with a brightness of

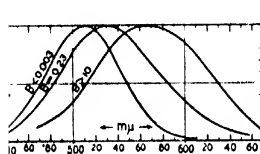


FIG. 1.—Relative visibility (V) (28, 46).

B = brightness, unit = 1 millilambert; abscissae = wave-lengths.

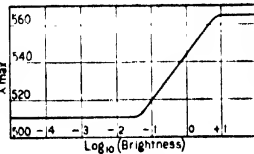


FIG. 2.—Position (λ_{max}) of maximum visibility (28, 46).

Unit of brightness = 1 millilambert.

5 to 80 millilamberts, the maximum visibility for the average observer, is near (9) $\lambda = 557.6$ $m\mu$, but even normal subjects exhibit individual differences; out of 125 subjects, the percentage finding the maximum at each of the several wave-lengths was as follows (9):

λ	%	λ	%	λ	%	λ	%	λ	%	λ	%
549	2	553	4	557	12	561	2	565	2	569	0
550	2	554	7	558	13	562	3	566	2	570	2
551	5	555	9	559	12	563	2	567	0		
552	3	556	8	560	7	564	1	568	2		

All of the preceding refer to direct vision. The sensitivity of other portions of the retina is greater.

Complementary colors are those pairs of colors which, when superposed upon the retina in suitable proportions, produce the sensation of white. Grunberg states that if their wave-lengths are $\lambda m\mu$, $\lambda' m\mu$, then $(\lambda - 559)/(498 - \lambda') = 424$, $\lambda > 559$, $\lambda' < 498$ (47); there are no complementaries to the colors in the range 498 $m\mu$ to 559 $m\mu$.

Stable, or invariable, colors are those which do not change in hue, except to become gray, as they are moved from the fovea to the periphery of the retina. They are: yellow of $\lambda = 570 m\mu$; bluish green of $\lambda = 490 m\mu$; blue of $\lambda = 460 m\mu$; and a non-spectral bluish red (21).

Discrimination of Brightnesses.—For large adjacent fields, differences of 1% or even of 0.8% in the brightness can be detected (31) if the brightness is of the order of 100 millilamberts. Under such

conditions the color of the light has no effect upon the discrimination. At lower brightnesses, the sensitiveness to change in brightness depends upon both the color and the brightness (Fig. 4).

Resolving power of the eye is the smallest angular separation at which two points, under the best illumination, can be seen as distinct. For different observers, it varies from 50" to 93" (20); the generally accepted normal value is 1'. It varies with the color of the light. In day-light and on a bright background, a dark line a few minutes long can be seen if it is 1.2" wide; but, on a dark background, a bright line is not visible unless it is at least 3.5" wide (48).

Aligning power, the ability to detect a lack of alignment of two similar, adjacent lines of the same width, as in setting a vernier, exceeds the resolving power. The average error (48) of skilled observers under best conditions corresponds to a visual error of not over 3"; in coincidence range-finders, the images can be aligned with an error not greater than 12" and sometimes as small as 2".

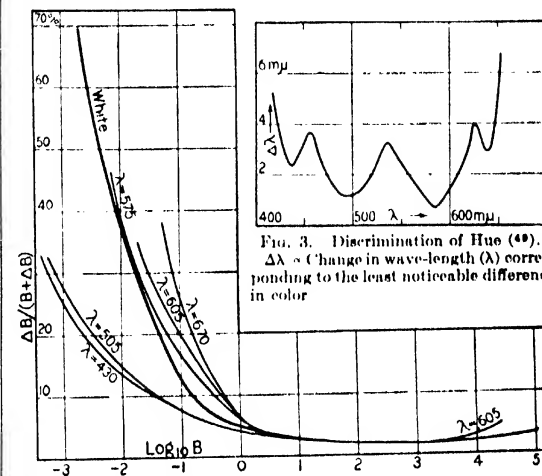


FIG. 3.—Discrimination of Hue (49).
 $\Delta\lambda$ = Change in wave-length (λ) corresponding to the least noticeable difference in color.

FIG. 4.—Discrimination of brightnesses (39, 40).
 ΔB = least noticeable increase in the brightness (B). Unit of B is 1 millilambert; of wave-length (Δ) is 1 $m\mu$.

Acuity, or discrimination of form, is closely related to the resolving power, but differs from that in dealing, in general, with extended, interpenetrating, bright and dark areas, and frequently with low brightnesses. The **absolute acuity** (A) is the reciprocal of the smallest visual angle for which neighboring contrasted portions of the field can be seen as separated. Its variation with the brightness (B) of the brighter portions of the field is given by the equation (25) $A = c + k \log B$; the values of the constants c and k are determined by the units, the character of the field, and the eye; some values are given in Table 3. The unit commonly employed for A is 1 reciprocal minute.

TABLE 3.—ABSOLUTE ACUITY (A) AND BRIGHTNESS (B)

$$A = c + k \log_{10} B \text{ (cf. Fig. 5)}$$

Unit of: A = 1 minute⁻¹; B = 1 millilambert

Limits of B	c	k	Field	Lit.
0.01 to 43.5	1.05	0.415	Snellen and similar charts	(27)
40 to 1000	1.69	0.000	Snellen and similar charts	(27)
0.1 to 18	1.44	0.573	Snellen and similar charts	(12)
0.02 to 21	1.23	0.282	Crossed gratings	(8)
0.06 to 26	1.33	0.262	Crossed gratings	(7)

When the test field is a Snellen test chart, the acuity is commonly expressed as the ratio of the maximum distance (d_m), at which the characters can be distinguished, to the standard distance (d_s). This ratio (d_m/d_s) may be called the *Snellen acuity*; it is numerically equal to the reciprocal of the visual angle (in minutes) subtended by the sides of the elementary squares of the chart. As expressed in these units, the acuity of the average good eye exceeds 1.00; for the E-hooks, the mean of 100 subjects was 1.74, ranging from 1.00 to 2.45 (54).

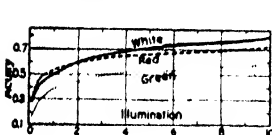


Fig. 5.—Acuity in white and in chromatic illumination (54). Unit of acuity = 1 Snellen unit; of illumination = 1 meter-candle

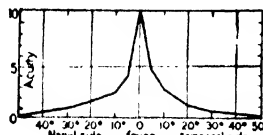


Fig. 6.—Relative acuity in indirect vision (20). Abscissa indicates angular position of image upon the retina.

The effect of dark adaptation upon acuity may be obtained by determining, at various intervals (t) after the light adapted eye had been placed in darkness, the minimum illumination (I) in which it can distinguish Snellen test characters placed at a known distance. For a distance corresponding to a Snellen acuity of $\frac{1}{2}$ ($= 0.2$), the median¹ values of I for 6 observers having in daylight a Snellen acuity of $\frac{1}{4}$ ($= 1.5$) were found to be as follows (13):

t	0	5	10	15	25	35	45 minutes
I	1.09	0.70	0.50	0.40	0.34	0.42	0.42 meter-candles

The acuity depends also upon the color of the light, and upon the position of the image upon the retina. See Figs. 5, 6.

Detection of Differences in Length.—About 1% of the length is the least noticeable difference for simultaneously presented parallel lines which are relatively displaced (result of several old investigations). More recent work shows that a variable line, 1 to 5 cm long, can, by eye, be set to equality with a standard line with a probable error, for a single setting, of only 0.4%; for shorter lines the error is greater, attaining 0.5% for lines 1 mm long (36). When the time allowed for observation and judgment is short, the differences which can be detected with certainty are considerably greater. If the sign of the difference is to be judged correctly in 75% of the trials, then, for a 10 cm line, the difference must be 3.5 mm if the time is 4 seconds, and over 5 mm if the time is only 0.5 second (18).

Decimal Subdivision of a Small Distance.—When a fine line is set on a millimeter scale to successive positions in random order, and the subject is required to estimate its position to the nearest 0.1 mm, the average actual setting, for each tenth as estimated by 10 subjects (total of 6000 readings), for horizontal and for vertical scales was as follows (3, 52):

Estimate	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Horizontal	0.126	0.231	0.336	0.423	0.509	0.591	0.676	0.773	0.886	1.001
Vertical	0.106	0.202	0.308	0.395	0.486	0.576	0.652	0.757	0.875	0.992

The lines of the scale were presumably of the same width as the "fine line" of variable position. Settings were distributed over a length of 30 mm, the illumination was good, and the distance was that for best reading.

SENSES OTHER THAN SIGHT

Range of audible tones is from 18 to 18 600 double vibrations per second (44, 53); at high intensities the lower limit may be reduced

¹ For each value of t , the 6 observed values of I are arranged in order of magnitude, the mean of the third and the fourth of the values is by definition the median of the set.

to 12. At the upper limit, individuals varied from 15 000 to 22 000 d.v. per sec. As the age increases, the upper limit becomes lower (Fig. 7).

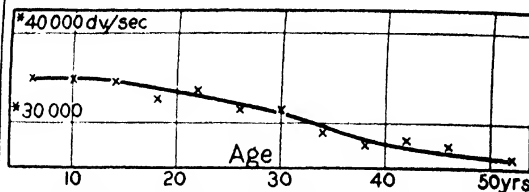


Fig. 7.—Dependence of highest audible tone upon age of subject (4). * It is probable that these frequencies should be divided by two.

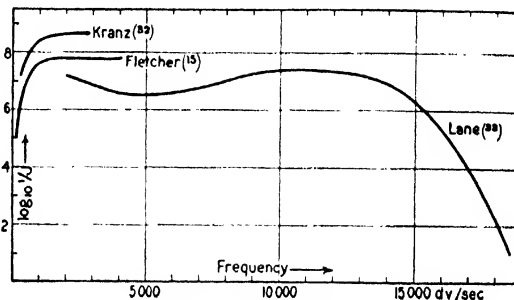


Fig. 8.—Aural sensitivity.

J = minimum audible power, unit = 1 erg cm⁻² sec⁻¹. Data in terms of effective, or r.m.s., pressure (P) in dynes cm⁻² have been reduced to erg cm⁻² sec⁻¹ (E) by means of the relation $P = \sqrt{dE} = 6.5\sqrt{E}$; d = density of air, v = velocity of sound in air, both in cgs units.

REACTION TIMES

The *simple reaction time*, or, briefly, the *reaction time*, is the interval which elapses between the application of a definite,

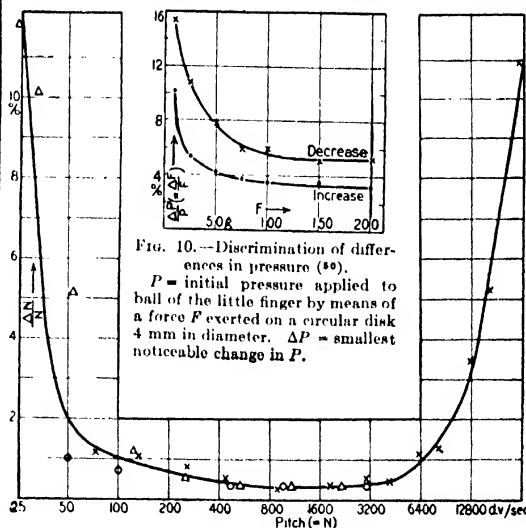


Fig. 9.—Discrimination of pitch.

N = number of double vibrations per sec; ΔN = smallest noticeable change in N . \circ = Knudsen (51), \times = Stücker (51), Δ = Vance & Schaefer (52).

expected stimulus and the performance of a prescribed movement (usually a finger movement) indicating that it has been perceived.

Light.—For foveal stimulation of medium intensity, reaction time is 0.190 (± 0.008) sec; individuals range from 0.150 to 0.225 sec. It is the same for withdrawal as for initiation of stimulus (22). For faint stimulation, near threshold, interval is increased by 0.04 to 0.05 sec (16); reaction to withdrawal is 0.005 to 0.025 sec quicker than to initiation of stimulus (22). For photo-

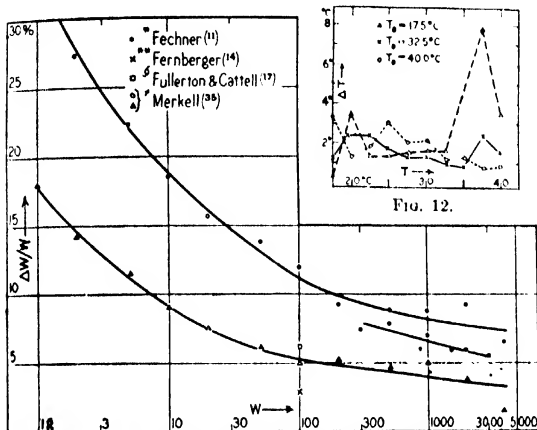


FIG. 11.—Discrimination of differences in lifted weights. ΔW = smallest noticeable change in the weight W .

* Weights had horizontal handles, were lifted successively with same hand.
 ** Cylindrical boxes lifted successively with same hand; ΔW is change for which 50 % of the estimates were of proper sign.
 † Cylindrical boxes lifted successively with same hand; ΔW is change for which 75 % of the estimates were of proper sign.
 ‡ Weights lifted by downward pressure of finger on a lever, several series of observations; curves represent the extremes.

FIG. 12.—Discrimination of differences in temperature (1).

Both hands were adapted by immersion in water of temperature T_a , they were then separately placed simultaneously in water at temperatures T and T_1 . ΔT = least value of $(T_1 - T)$ which could be detected

metrically equal stimuli of different colors, reaction time is independent of the color (22). Reaction time for eye to turn towards a stimulus in indirect vision is 0.151 sec (or 1.181 sec) if stimulus lies 1° (or 5°) from fixation point (10). For medium intensity, reaction time to monocular stimulation is about 0.015 sec greater than for binocular (43).

TABLE 4.—DISCRIMINATION REACTION TIME

Unit of T = 0.001 sec; L_1, L_2 = 1 cm, λ = $1\text{ m}\mu$ = 10λ

Position of squares* or circles†				Length‡ (21)			
Contrast (21)		Contrast (21)		T		T	
λ	T	λ	T	L_1	L_2	L_1	L_2
Black and							
White	205	Red (640) and	627 270	1	1	3	312
Orange	640 222	Orange red	614 257	1	1	25	313
Red	614 218	Yellow	585 227	1	1	2	318
Orange	585 211	Green	521 222	1	1	15	326
Yellow	521 218	Blue	452 231	1	1	1	335
Green	453 226	Yellow and	521 232	1	1	05	351
Blue	452 222	Green	452 222				
† Circles (24)	290	Blue					

* Two colored squares each 3 by 3 cm, placed side by side; observer was to react with corresponding hand to indicate on which side the previously specified square was placed. This type of discrimination reaction is the quickest. The same procedure was used in the discrimination of length.

† On a background of approximately 2.6 millilamberts and at a visual angle of $45'$ to each side of fixation point was a circle of angular diameter = $24'$, brightness = 3.5% greater than that of background. Either circle could be made to disappear, and the subject, by a reaction with the corresponding hand, indicated which disappeared.

Sound.—For finger reaction to sound of medium intensity, reaction time = 0.136 (± 0.002) sec; individuals range from 0.082 to 0.195 sec. For very faint sound, the interval is increased by 0.06 to 0.07 sec (16).

Touch.—For finger reaction to tactile stimulus of medium intensity, reaction time is 0.148 sec (23).

The *discrimination reaction time* is the interval which elapses between the application of one of two possible, definite, expected stimuli and the performance of the prescribed movement indicating which of the two stimuli has been applied. For printed letters, 10-point type, average for the alphabet, the reaction time for Roman capitals is 0.327 sec, Roman lower case 0.325, for short words 0.353, for long words 0.355, for small (1 cm square) pictures of familiar objects 0.336 sec (6). For other data, see Table 4.

Number Limitation and Span of Apprehension.—For college students, the greatest number of digits which an individual can repeat correctly immediately after a single auditory presentation averages 7.6 (5, 19), individuals range from 5 to 11 (5); for visual presentation the average is 8.0 (19).

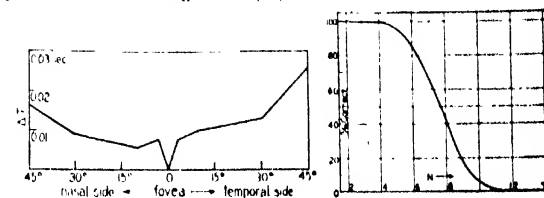


FIG. 13.—Reaction time for non-foveal stimulation (22).

ΔT = excess of reaction time over that required for foveal excitation. Abscissa indicates angular position of image upon the retina. Finger reaction.

FIG. 14.—Span of apprehension (41).

N = number of dots exposed; ordinates = % of judgments which were correct.

When a number of black dots irregularly arranged upon a well illuminated white background were exposed to view for a very short interval (0.038 sec) and the subject was required to determine the number of dots presented, the average number of correct judgments made after considerable, but not extreme, practice was as shown in Fig. 14. The visual angle subtended by the dots was well above the threshold value.

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(For a key to the periodicals see end of volume)

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- (50) Stratton, 552, 12: 538, 06 (51) Stücker, 75, 96: 367; 07. (52) Urban, *Arch. ges. Psychol.*, 31: 1: 14 (53) Vance and Schaefer, 550, 66: 114, 115, 14. (54) Woodworth and Bruner, 0

ARRANGEMENT OF CHEMICAL SUBSTANCES

Throughout I. C. T., except when otherwise indicated, the tabular arrangement of all chemical substances and of all systems capable of representation by formula is in accordance with a system called the "Standard Arrangement," which will now be explained and which should be learned by every user of I. C. T.

Elementary Substances

All tables containing *only* elementary substances (A-Tables) are arranged in alphabetical order of the symbols of the elements. In tables containing both elements and compounds (AB-Tables) the elements follow the "standard arrangement," *vide infra*.

Chemical Compounds and Other Systems Represented by Formula

The arrangement is based upon the following table of "Key-numbers" of the elements:

KEY-NUMBERS OF THE ELEMENTS										NOMBRES CLÉS DES ÉLÉMENTS															
-6	5	-4	-3	2	1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
(He	Ne	A	Kr	Xe	Rn)	O	H	F	Cl	Br	I	(85)	S	Se	Te	N	P	As	Sb	Bi	C	Po	Si	Ti	Ge
						46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
						Cr	Mo	W	U	V	Cb(Nb)	Ta	Pa	B	Al	Sc	Y	La	Ce	Pr	Nd	(61)	Sa	Eu	Gd
Ac	Ag	Al	As	Au		B	Ba	Be	Bi	Br	C	Ca	Cb	Cd	Ce	Cl	Co	Cr	Cs	Cu	Dy	Er	Eu	F	Fe
74	32	55	13	33		54	79	75	15	5	16	77	51	29	59	4	44	46	85	31	67	69	64	3	43
						Os	P	Pa	Pb	Pd	Po	Pr	Pt	Ra	Rb	Re	Rh	Ru	S	Sa	Sb	Sc	Se	Si	Sn
						35	12	53	23	41	17	60	37	80	84	34	40	39	8	63	14	56	9	18	22

To locate a given compound, first write its "key-formula," neglecting water of crystallization, thus:

Afin de situer un composé donné, il faut d'abord écrire sa "formule-clé," en négligeant l'eau de cristallisation, ainsi:

Compound	Composé	Na_2SO_4	$\text{HClO}_4 \cdot 3\text{H}_2\text{O}$	$\text{Hg}(\text{C}_{10}\text{H}_{15}\text{O}_2)_2$	$2\text{Fe}_2\text{O}_3 \cdot \text{P}_2\text{O}_5 \cdot 12\text{H}_2\text{O}$	$\text{Ni}_2\text{Pr}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	$\text{I}_5\text{C}_5\text{H}_5\text{SO}_3\text{H}$	$(\text{NH}_4)_2\text{CO}_3$
Key formula	Formule-clé	82-8-1	4-2-1	30-16-2-1	43-12-1	60-45-11-1	16-8-6-2-1	16-11-2-1

In writing a key-formula the key-numbers must be written in descending order.

All chemical compounds (B-Tables) are arranged in the inverse numerical order of their key-formulae. *Example:* to find the compound $\text{Hg}(\text{C}_{10}\text{H}_{15}\text{O}_2)_2 = 30 - 16 - 2 - 1$; First, turn to section 30 of the table. Then follow down the column of chemical formulae until element 16 (C) is first encountered. From this point continue until element 2 (H) is found, and then on until element 1 (O) is reached. At this point will be found all the compounds composed of the four elements Hg, C, H, and O and these compounds are arranged in an obvious manner according to the subscripts in the chemical formula. To facilitate the use of the tables, key-numbers are inserted at frequent intervals either along the top of the page or down the left hand column or both.

In looking for a chemical compound *always consult the B-Table*, the scope of which provides for *all* chemical compounds except those of the radioactive elements, of which only compounds of U, Th and Ra are given in the B-Table. For the others see p. 364. In certain of the B-Tables, at the point where key-formulae beginning with 16 occur, there will be found frequently only a few of the simpler compounds, and the reader will be referred to a

ARRANGEMENT OF CHEMICAL SUB-

ARRANGEMENT DES SUBSTANCES CHIMIQUES

L'arrangement tabulaire de toutes les substances chimiques et de tous les systèmes susceptibles d'une représentation par formule est, dans les T. C. I., excepté lorsqu'il y a une autre indication, en accord avec un système appelé "arrangement type," (standard arrangement) expliqué ci-dessous, qui devra être appris par chaque personne qui veut utiliser les T. C. I.

Substances Élémentaires

Toutes les tables ne contenant que les substances élémentaires (Tables A) sont arrangées dans l'ordre alphabétique des symboles des éléments. Dans les tables contenant les éléments et les corps composés (Tables AB) les éléments se trouvent suivant l' "arrangement type" voir *infra*.

Composés Chimiques et Autres Systèmes Représentés Par Formule

L'arrangement est basé sur la table suivante des "nombres clés" des éléments

Lorsqu' on écrit une formule-clé, les nombres clés doivent être écrits dans l'ordre des valeurs décroissantes.

Tous les composés chimiques dans toutes les tables (Tables B.) sont arrangés d'après l'ordre numérique inverse de leurs formules-clés. *Exemple:* pour trouver le composé $\text{Hg}(\text{C}_{10}\text{H}_{15}\text{O}_2)_2 = 30-16-2-1$; il s'agit premièrement de chercher la section 30 de la table; ensuite de suivre en descendant la colonne des formules chimiques jusqu'à ce qu'on trouve l'élément 16 (C). De ce point, on continue jusqu'à ce qu'on rencontre l'élément 2 (H), et ensuite jusqu'à ce que l'élément 1 (O) soit atteint. On trouvera alors à ce point tous les composés renfermant les quatre éléments Hg, C, H et O et ces composés sont arrangés d'une manière apparante en relation avec les indices de leurs formules chimiques. Afin de faciliter l'usage des tables, les nombres-clés sont inscrits, à de fréquents intervalles, ou au haut de la page ou le long de la colonne gauche, ou aux deux places.

Pour la recherche d'un composé chimique, il s'agit de *consulter toujours la Table B* dont le but est de renseigner sur *tous* les composés chimiques, à l'exception des éléments radio-actifs, dont seuls ceux de U, Th et Ra sont donnés dans la Table B. Pour les autres, voir p. 364. Dans certaines des Tables B, au point où les

STANCES AND SYSTEMS IN I. C. T.

DIE ANORDNUNG DER CHEMISCHEN VERBINDUNGEN

Durch die ganzen I. C. T., ausgenommen es ist etwas anderes angegeben, ist die tabellarische Anordnung aller chemischen Verbindungen und aller durch chemische Zeichen oder Formeln darstellbarer Systeme, nach der "Normal-Anordnung" (standard arrangement), durchgeführt. Sie ist im folgenden dargelegt und soll von jedem Leser der I. C. T. erlernt werden.

Elementare Stoffe

Alle Tafeln, welche nur elementare Stoffe (A-Tabellen) enthalten, sind in alphabetischer Reihenfolge nach den Symbolen der Elemente angeordnet. In den Tafeln, welche beides, Elemente und Verbindungen (AB-Tabellen), enthalten, folgen die Elemente der "Normal-Anordnung." Siehe weiter unten.

Die chemischen Verbindungen und andere durch Formeln darstellbare Systeme

Die Anordnung ist auf der folgenden Tafel begründet, welche die "Schlüsselnummern" der Elemente enthält:

SCHLÜSSELNUMMERN DER ELEMENTE										NUMERI CHIAVE DEGLI ELEMENTI														
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Zr	Sn	Pb	Th	Ga	In	Tl	Zn	Cd	Hg	Cu	Ag	Au	Re	Os	Ir	Pt	Ma	Ru	Rh	Pd	Mn	Fe	Co	Ni
66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86				
Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ac	Be(Gl)	Mg	Ca	Sr	Ba	Ra	Li	Na	K	Rb	Cs	(87)				
Ga	Gd	Ge	Gl	H	Hf	Hg	Ho	I	In	Ir	K	La	Li	Lu	Ma	Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O
25	65	20	75	2	73	30	68	6	26	36	83	58	81	72	38	76	42	47	11	82	51	61	45	1
Sr	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr	(61)	(75)	(85)	(87)						
78	52	66	10	24	19	27	70	49	50	48	57	71	28	21	62	34	7	86						

Um eine gegebene Verbindung aufzufinden, hat man zuerst seine Schlüsselformel aufzuschreiben, wobei man das Kristallwasser auslässt, z B.:

Verbindungen	Composto	Na ₂ SO ₄	HClO ₄ 3H ₂ O	Hg(C ₁₈ H ₃₃ O ₂) ₂	2Fe ₂ O ₃ P ₂ O ₅ 12H ₂ O	Ni ₃ Pr ₂ (NO ₃) ₁₃ 24H ₂ O	I ₂ C ₄ H ₈ SO ₃ H	(NH ₄) ₂ CO ₃
Schlüssel-formel	Formula chiave	82-8-1	4-2-1	30-16-2-1	43-12-1	60-45-11-1	16-8-6-2-1	16-11-2-1

In die Schlüsselformel müssen die Schlüsselnummern in absteigender Reihenfolge geschrieben werden.

Alle chemischen Verbindungen (B-Tabellen) sind in der umgekehrten Reihenfolge der Schlüsselnummern angeordnet. Z. B.: Um die Verbindung Hg(C₁₈H₃₃O₂)₂ = 30-16-2-1 zu finden, hat man zuerst den Abschnitt 30 aufzusuchen. Dann hat man den Kolonnen der chemischen Verbindungen abwärts zu folgen, bis man zuerst das Element 16 (C) antrifft, von da an setzt man weiter fort, bis das Element 2 (H) gefunden ist und dann weiter, bis das Element 1 (O) erreicht ist. Bei dieser Stelle werden alle Verbindungen gefunden werden, welche sich aus den 4 Elementen Hg, C, H, und O zusammensetzen. Diese Verbindungen sind in deutlicher Art, entsprechend der Bezeichnungsweise chemischer Formeln, angeordnet. Um den Gebrauch der Tafeln möglichst zu erleichtern, sind die Schlüsselnummern häufig an verschiedenen Stellen eingefügt. Sie befinden sich entweder am Kopf der Seiten, oder auf der linken Seite unten, oder an beiden Stellen.

Um eine chemische Verbindung zu suchen, benutze man immer die B-Tabellen: die alle chemischen Verbindungen enthalten, ausgenommen jene der radioaktiven Elemente. Von diesen sind

ORDINE DI ELENCAZIONE DELLE SOSTANZE

In tutti i volumi delle T. C. I. l'ordine in cui le sostanze ed i sistemi rappresentabili con formule sono disposti nelle tabelle è (tranne che non sia diversamente indicato) quello "standard" illustrato più avanti. Chiunque voglia servirsi delle T. C. I. deve anzitutto apprendere in che consiste questo sistema "standard."

Sostanze Elementari

Tutte le Tabelle contenenti soltanto sostanze elementari (tabelle A) sono disposte secondo l'ordine alfabetico dei simboli degli elementi. Nelle tabelle che comprendono elementi e composti (tabelle AB-B) gli elementi sono ordinati secondo la disposizione "Standard" e *infra*.

Composti Chimici ed Altri Sistemi Rappresentati da Formule

La disposizione è basata sul quadro seguente di "numeri chiave" degli elementi.

Per trovare il posto di un dato composto bisogna prima scrivere la formula chiave trascurando l'acqua di cristallizzazione, p. es.

Nella formula chiave, i numeri chiave devono essere scritti in ordine decrescente.

Tutti i composti in tutte le tabelle (Tabelle B) sono disposti nell'ordine numerico inverso delle loro formule chiave.

Supponiamo ad es. di voler trovare il composto Hg(C₁₈H₃₃O₂)₂ = 30-16-2-1. Prima si cerca la sezione 30 della Tabella, poi si sceglie la colonna delle formule fino ad incontrare l'elemento 16 (C). Da questo punto si continua finché si trova l'elemento 2 (H), e quindi fino a raggiungere l'elemento 1 (O). Qui si trovano tutti i composti risultanti dai quattro elementi Hg, C, H e O ordinati secondo gli indici delle formule. Per facilitare l'uso delle tabelle i numeri chiave sono inseriti ad intervalli frequenti nella testata o lungo il margine sinistro della pagina, o nell'una e nell'altro.

Per cercare un composto bisogna sempre consultare la tabella B che contiene tutti i composti tranne quelli degli elementi radioattivi; di questi sono riportati nella tabella B soltanto i composti di U, Th, Ra. Per gli altri vedi p. 364. In alcune tabelle B, laddove si trovano formule chiave che cominciano con 16, si troveranno spesso soltanto pochi composti fra i più semplici e il lettore

C-Table where the remainder of such compounds will be found listed under a different arrangement known as

The C-Arrangement

In this arrangement the compounds are arranged according to their empirical formulae (including water of crystallization), in the order C, H, with the remaining symbols alphabetical, e.g., $C_6H_{12}O_8S$. The **C**-Tables, however, will not contain any carbon compound whose key-formula contains a number greater than 16.

SYSTEMS OF MORE THAN ONE COMPONENT

The components of each system are first arranged according to the standard arrangement, giving the order A, B, C, etc. The systems are then arranged, according to the standard arrangement, in the order of their A-components. All systems having the same A-component will be found (under that component) in the order of their B-components, etc.

In certain tables, the above plan will be based upon the **C**-arrangement instead of the standard arrangement. Such cases will always be so indicated.

Name Indices

The chemical formulae of nearly all of the organic compounds and minerals whose properties are given in I. C. T., can be found with the aid of the extensive indices of names given on p. 174 and 280. If the name is not found there, other works of reference must be consulted for the formula. It should be noted, however, that the exact formula is not required. The compound can be readily located if only the elements composing it are known (in the case of inorganic compounds) or if only the number of carbon atoms are known (in the case of organic compounds) provided only that the user can recognize either name or formula when he sees it.

PHYSICAL PROPERTIES OF CHEMICAL SUBSTANCES

INTRODUCTION

The following tables (p. 96 to 314) are intended to serve as a source of ready reference for the *approximate* values of certain properties of chemical substances, displayed in such a manner as to be of the greatest utility. The values given may be uncertain by one or more units in the last significant figure. Non-significant figures are given in small type. Thus, 2300 indicates that the correct value lies between 1800 and 2800, with 2300 as most probable value.

More accurate values for these properties, if known, will be found in subsequent sections of I. C. T., together with their literature references.

A. ELEMENTARY SUBSTANCES AND ATMOSPHERIC AIR

A-Tables, p. 102. Values in parentheses are estimated, usually with the aid of the Periodic Law.

B. CHEMICAL COMPOUNDS. STANDARD ARRANGEMENT (v. p. 96)

B-Tables, p. 106

1. Formula or formula and name.
2. Gram-formula-weight. (I. C. T. atomic weights, v. p. 43.)
3. Crystal system.

B-Table.

Special tables.

formules-clés commençant par 16 se présentent, on ne trouvera fréquemment qu'un petit nombre de composés plus simples, et le lecteur sera alors renvoyé à une Table **C**, où le reste de ces composés se trouvera disposé d'une façon différente nommée

L'Arrangement C

Dans cet arrangement, les composés sont disposés en relation avec leurs formules empiriques (l'eau de cristallisation inclusive-ment) dans l'ordre C, H, les symboles restants venant ensuite dans l'ordre alphabétique; par ex: $C_6H_{12}O_8S$. Cependant les Tables **C** ne contiendront aucun composé dont la formule-clé renferme un nombre supérieur à 16.

SYSTÈMES DE PLUS D'UN COMPOSANT

Les *composants* de chaque système sont premièrement disposés d'après l'arrangement type suivant l'ordre A, B, C, etc. Les *systèmes* sont alors arrangés, en accord avec l'arrangement type, dans l'ordre de leurs composants A. Tous les systèmes ayant le même composant A seront trouvés sous ce composant dans l'ordre de leurs composants B, etc.

Dans certaines tables, le plan sera basé sur l'arrangement **C** au lieu de l'arrangement type. De tels cas seront toujours mentionnés.

Noms Indices (Anglais)

Les formules chimiques de presque tous les composés organiques et les minéraux dont les propriétés sont données dans les T. C. I. peuvent être trouvées au moyen des indices extensifs des noms donnés aux p. 174 et 280.

Si l'on ne trouve pas le nom à cette place, il faudra consulter d'autres ouvrages de références pour la formule. Il faut noter, cependant, que la formule exacte n'est pas nécessaire. Le composé peut être immédiatement situé si l'on ne connaît que les éléments qui le composent (dans le cas des composés inorganiques), ou que les nombres des atomes de C (dans le cas des composés organiques); à la seule condition que le lecteur puisse reconnaître ou le nom ou la formule lorsqu'il la voit.

PROPRIÉTÉS PHYSIQUES DES SUBSTANCES CHIMIQUES

INTRODUCTION

Les tables suivantes (p. 96 à 314) ont été établies dans le but de servir de source de référence rapide pour les valeurs *approximatives* de certaines propriétés des substances chimiques, et sont disposées de manière à être de la plus grande utilité possible. Les valeurs données peuvent être incertaines par une ou plusieurs unités de leur dernier chiffre significatif. Les chiffres non significatifs sont donnés en petits caractères. Ainsi, 2300 indique que la valeur correcte se trouve entre 1800 et 2800, avec 2300 comme valeur la plus probable. Si l'on connaît des valeurs plus précises pour ces propriétés, on les trouvera dans les sections suivantes des T. C. I., accompagnées de leurs références bibliographiques.

A. SUBSTANCES ÉLÉMENTAIRES ET AIR ATMOSPHÉRIQUE

Tables **A**, p. 102. Les valeurs entre parenthèses sont estimées ordinairement à l'aide de la Loi périodique.

B. COMPOSÉS CHIMIQUES. ARRANGEMENT TYPE (v. p. 96)

Tables **B**, (p. 106)

1. Formule ou formule et nom.
2. Poids moléculaire en grammes (Poids atomiques des T. C. I., v. p. 43.)

in den **B**-Tabellen nur die Verbindungen des U, Th und Ra enthalten. Für die anderen siehe Seite 364. In einigen **B**-Tabellen, dort wo die Schlüsselnummern mit 16 beginnen, findet man häufig nur einige wenige einfache Verbindungen. Der Leser wird dann auf die **C**-Tabellen verwiesen, wo die restlichen derartigen Verbindungen gefunden werden können. Diese Tabellen sind nach anderen Gesichtspunkten zusammengestellt. Es ist das die

C-Anordnung (C-Arrangement)

Bei dieser Anordnung sind die Verbindungen nach ihrer empirischen Formel gegeben (einschliesslich Kristallwasser) und zwar in der Ordnung C, H, die restlichen Zeichen dann in alphabetischer Ordnung, z.B. $C_6H_{12}O_2S$. Die **C**-Tabellen enthalten jedoch keine Kohlenstoffverbindung, in deren Schlüssel-formel eine Zahl grösser als 16 vorkommt.

SYSTEME MIT MEHR ALS EINER KOMPONENTE

Die Komponenten jedes einzeln Systemes sind zuerst in der Reihenfolge A, B, C, u. s. w., entsprechend des "Standard-Arrangement" anzuordnen. Die Systeme sind dann, entsprechend des "Standard-Arrangement," in der Reihenfolge ihrer A-Komponenten angegeben. Alle Systeme, welche dieselbe A-Komponente haben, werden unter dieser Komponente in der Reihenfolge ihrer B-Komponenten gefunden.

In gewissen Tabellen wird dieser Plan entsprechend der **C**-Anordnung, an Stelle des "Standard Arrangement," gewählt. Solche Fälle werden immer entsprechend bemerkt.

Namenverzeichnis (Englisch)

Die chemischen Formeln von so ziemlich allen organischen Verbindungen und Mineralien, deren Eigenschaften in den I. C. T. enthalten sind, können mit Hilfe des ausgedehnten Namenverzeichnisses auf Seite 174 und 280 gefunden werden. Ist der Name hier nicht auffindbar, so müssten andere Quellen für die Formel nachgesehen werden. Es soll aber bemerkt werden, dass eine genaue Formel nicht nötig ist. Die Verbindung kann bei anorganischen Verbindungen leicht aufgefunden werden, wenn nur die Elemente, die sie zusammensetzen, bekannt sind, bei organischen Verbindungen, wenn nur die Zahl der Kohlenstoffatome bekannt ist. Nötig ist es, dass der Leser entweder den Namen oder die Formel beim Ansehen erkennt.

DIE PHYSIKALISCHEN EIGENSCHAFTEN CHEMISCHER STOFFE

EINFÜHRUNG

Die folgenden Tafeln (s. 96 bis 314) sollen zur raschen Orientierung über angenäherte Werte gewisser Eigenschaften chemischer Verbindungen dienen. Sie sind in einer solchen Art angeordnet, um vom grösstmöglichen Nutzen zu sein. Die angegebenen Werte können auf einer oder mehreren Stellen der letzten grossgeschriebenen Ziffer unsicher sein. Z.B. sagt die Zahl 2300 aus, dass der zwischen 1800 und 2800 liegende Wert am wahrscheinlichsten 2300 sein wird.

Genauere Werte für diese Eigenschaften können, wenn sie bekannt sind, in den weiter unten vorhandenen Abschnitten der I. C. T. zusammen mit der Literatur gefunden werden.

A. ELEMENTARE STOFFE UND DIE ATMOSPHERISCHE LUFT

A-Tabellen, Seite 102. Werte, die in den Klammern sich befinden, sind geschätzt gewöhnlich nach dem periodischen System der Elemente.

B. CHEMISCHE VERBINDUNGEN. NORMAL-ANORDNUNG [STANDARD-ARRANGEMENT] (siehe S. 97)

B-Tabellen, Seite 106

1. Formel oder Formel und Name.
2. Gramm-Formel-Gewicht (Atomgewichte der I. C. T. siehe S. 43.)

sarà rimandato a una tabella **C** dove si troveranno gli altri disposti con criterio differente che viene chiamato

La Disposizione C

Secondo questa i composti sono disposti in base alle formule empiriche (compresa l'acqua di cristallizzazione) nell'ordine C, H e con i rimanenti simboli ordinati alfabeticamente P. es. $C_6H_{12}O_2S$. Le tabelle **C** non comprendono però composti del carbonio che hanno un numero chiave più grande di 16.

SISTEMI DI PIU' D'UN COMPONENTE

I componenti di ciascun sistema sono dapprima disposti secondo la disposizione tipo, nell'ordine A, B, C, etc. I sistemi sono quindi disposti, secondo la disposizione tipo, nell'ordine dei loro componenti A. Tutti i sistemi aventi lo stesso componente A verranno trovati, sotto questo componente, nell'ordine dei loro componenti B, etc.

In alcune tavole il piano sarà basato sulla disposizione **C** in luogo della disposizione tipo. Di ciò verrà sempre fatta menzione.

Indici Per Nome (Inglese)

Le formule chimiche di quasi tutti i composti organici e minerali di cui sono riportate le proprietà nelle T. C. I. si possono trovare con l'aiuto di estesi indici di nomi dati a p. 174, e 280. Se negli indici non si trova il nome bisogna consultare altre opere per trovare la formula. Deve tuttavia notarsi che non è necessaria la formula esatta. Il composto può essere facilmente ritrovato se si conoscono solo gli elementi componenti (nel caso di composti inorganici) o se si conosce solo il numero di atomi di carbonio (nel caso di composti organici) purchè il lettore sia in grado di riconoscerne il nome o la formula quando li vede.

PROPRIETA' FISICHE DELLE SOSTANZE

INTRODUZIONE

Le tabelle seguenti (p. 96 a 314) hanno lo scopo di fornire per una serie di sostanze valori approssimati di certe proprietà disposti in modo da essere della più grande utilità. I valori riportati possono essere incerti per una o più unità nelle ultime cifre significative. Le cifre non significative sono indicate in caratteri piccoli. Così 2300 indica che il valore esatto si trova fra 1800 e 2800, e che 2300 è il valore più probabile.

Valori più precisi di queste proprietà quando sono conosciuti, sono riportati nelle sezioni successive delle T. C. I. insieme con le relative indicazioni bibliografiche.

A. SOSTANZE ELEMENTARI ED ARIA ATMOSFERICA

Tabelle A, p. 102. I valori fra parentesi sono calcolati generalmente con l'aiuto della legge periodica.

B. COMPOSTI, DISPOSIZIONE STANDARD (v. p. 97)

Tabelle B, p. 106

1. Formula oppure formula e nome.
2. Peso della formula in grammi. (T. C. I. pesi atomici v. p. 43.)
3. Sistema cristallino.
Tabella B.
Tabelle speciali.
4. Punto di fusione. (Alla pressione di una atmosfera, tranne che non sia diversamente indicato dalla soprascritta; così $125^{17\text{atm}}$ = fonde a 125° alla pressione di 17 atmosfere.)
Tabella B

4. Melting point. (Under 1 atm. unless otherwise indicated by superscript, thus $125^{17\text{atm.}}$ melts at 125° under 17 atm.)

Table B.

5. Boiling point. (Under 760 mm Hg unless otherwise indicated by superscript, thus 321^{125} = boils at 321° under 125 mm Hg.)

Table B.

6. Density, g cm^{-3} . (At 20° unless otherwise indicated by superscript, thus 1.853^{40} = 1.853 g cm^{-3} at 40°C .)

Table B.

7. Refractive index and dispersion, (n_D and $H_D - H_a$) for 20° unless otherwise indicated.

3. Système cristallin.

Table B.

Tables spéciales.

4. Point de fusion. (Sous 1 atm. à moins d'une indication par exposant, ainsi $125^{17\text{atm.}}$ = fond à 125° sous 17 atm.)

Table B.

5. Point d'ébullition. (Sous 760 mm Hg à moins d'une indication par exposant, ainsi 321^{125} = bout à 321° sous 125 mm Hg.)

Table B.

6. Densité, g cm^{-3} . (A 20° à moins d'une indication par exposant, ainsi $1,853^{40}$ = g cm^{-3} à 40°C .)

Table B.

7. Indice de réfraction, et dispersion (n_D et $H_D - H_a$) à 20° à moins d'une indication.

ABBREVIATIONS AND CONVENTIONS

at. or atm.	atmosphere
C.	cubic or regular
d.	decomposes, e.g., d. 335 = decomposes at ca. 335° ; 335 d. = melts (resp. boils) at 335° with decomposition
diss.	a dissociation temperature
exp.	explodes
l.	liquid
H.	hexagonal
M.	monoclinic
P.	under pressure
s.	sublimation
s. d.	slight decomposition
R.	rhombic or orthorhombic
Tet.	tetragonal
Tr.	transition temperature
Tri.	triclinic
Trig.	trigonal
vac.	in vacuo
var.	variable

THE PROPERTY-SUBSTANCE TABLES

Following the General Tables will be found (p. 306) the Property-substance Tables, in each of which the substances, identified by Index Number, are arranged in ascending order of the values of the property, the intervals on the scale of values of the property being given in black-face type.

To Identify a Substance by Means of Its Properties.—*Example:* A liquid is found to have the following properties: B. P. = 81.1° at 745 mm, $d = 0.783$, $n_D = 1.347$. What is the substance? With the aid of Craft's rule, first correct the boiling point to 760 mm. If the general nature of the substance is unknown, put $c = 10^{-4}$ in the Craft's equation, $\Delta t = cT_D(760 - P)$. Thus in the present instance, we should have $\Delta t = 10^{-4} \times (81.1 + 273)(760 - 745) = 0.3^\circ$, and $t_D = 81.1 + 0.3 = 81.4^\circ$. Next turn to the special B. P. (p. 310), d (p. 313), and n (p. 276) tables and read off from these tables the index numbers of substances having values of the above properties in the neighborhood of those for the unknown substance. Thus, for the present example, the following index numbers will be obtained: For B. P., 130, 758, 727, 1612, 168, 277, 1535, 506, 792; for d , 208, 168, 395, 506, 3320, 1049, 262, 792, 5156; for n_D , 141, 168, 213. The only index number common to each of these properties is 168; and on turning to this index number in the General C-Table, we can readily identify our substance as acetonitrile. The identification can then be further checked by appropriate chemical tests, if desired.

ABRÉVIATIONS ET CONVENTIONS

at. ou atm.	atmosphère
C.	cubique ou régulier
d.	Se décompose, par ex., d. 335 = se décompose à environ 335° ; 335 d. = fond (resp. bout) à 335° avec décomposition
diss.	une température de dissociation
exp.	exploser
l.	liquide
H.	hexagonal
M.	monoclinique
P.	sous pression
s.	sublimation
s. d.	légère décomposition
R.	rhombique ou orthorhombique
Tet.	tétragonal ou quadratique
Tr.	température de transition
Tri.	triclinique
Trig.	trigonal
vac.	dans le vide
var.	variable

TABLES DES PROPRIÉTÉS DES SUBSTANCES

On trouvera (p. 306) à la suite des Tables générales, les Tables des Propriétés des Substances, dans chacune desquelles, les substances identifiées par leur Nombre-Index, sont arrangées dans l'ordre ascendant des valeurs de la propriété; les intervalles de l'échelle des valeurs de la propriété sont donnés en caractères gras.

Pour identifier une substance au moyen de ses propriétés.—*Exemple:* On a trouvé qu'un liquide a les propriétés suivantes: P.E. = 81.1° à 745 mm, $d = 0.783$, $n_D = 1.344$. Quelle est la substance? Au moyen de la règle de Craft, on corrige premièrement le point d'ébullition à 760 mm. Si la nature générale de la substance est inconnue, on pose $c = 10^{-4}$ dans l'équation de Craft, $\Delta t = cT_D(760 - P)$. Ainsi dans le cas présent, nous aurions $\Delta t = 10^{-4} \times (81.1 + 273)(760 - 745) = 0.3^\circ$, et $t_D = 81.1^\circ + 0.3^\circ = 81.4^\circ$. Ensuite on cherche dans les tables spéciales des P.E. (p. 310), des d (p. 313) et des n (p. 276) et on note les nombres-index des substances ayant les valeurs des propriétés ci-dessus dans le voisinage de celles de la substance inconnue. Ainsi, pour l'exemple présent, les nombres-index suivants seront obtenus: Pour le P.E., 130, 758, 727, 1612, 168, 277, 1535, 506, 792; pour d , 208, 168, 395, 506, 3320, 1049, 262, 792, 5156; pour n_D , 141, 168, 213. Le seul nombre-index commun à chacune de ces propriétés est 168; en revenant à ce nombre-index dans la Table générale C, et en notant les autres propriétés, on peut rapidement identifier notre substance comme étant acétonitrile. L'identification peut être alors poussée plus loin au moyen d'essais chimiques appropriés, si on le désire.

3. Kristall-System

3-Tabellen.

Besondere Tabellen.

4. Schmelzpunkt. (Bei 1 Atmosphäre: wird dem Werte eine Zahl rechts hinaufgesetzt, so bedeutet diese den Druck unter welchem der Schmelzpunkt angegeben ist. Es bedeutet 125¹⁷atm., der Schmelzpunkt ist bei einem Druck von 17 Atm. bei 125°)

3-Tabellen.

5. Siedepunkt. (Unter 760 mm Quecksilber: wird dem Werte eine Zahl rechts hinaufgesetzt, so bedeutet diese Zahl den Druck, unter welchem der Siedepunkt angegeben ist. Es bedeutet 321¹², der Siedepunkt liegt bei einem Druck von 125 mm Hg bei 321°)

3-Tabellen.

6. Dichte, g cm⁻³. (Bei 20°C: wird dem Wert eine Zahl rechts hinaufgesetzt, so bedeutet diese Zahl die Temperatur, für welche die Dichte angegeben ist. Es bedeutet 1.853⁴⁰; die Dichte bei 40° beträgt 1.853).

3-Tabellen.

7. Brechungs-Index und Dispersion, (n_D und $H_D - H_a$) für 20°, wenn nichts anderes angegeben ist.

ABKÜRZUNGEN UND ZEICHEN

at. oder atm.	Atmosphäre
C.	kubisch oder regulär
d.	zersetzt sich, z. B. d335 bedeutet, zersetzt sich bei ungefähr 335°; 335d bedeutet, schmilzt (oder siedet) bei ungefähr 335° unter Zersetzung
diss.	Dissoziations Temperatur
exp.	explodiert
l.	flüssig
H.	hexagonal
M.	monoklin
P.	unter Druck
s.	Sublimation
s.d.	schwache Zersetzung
R.	rhombisch oder orthorhombisch
Tet.	tetragonal
Tr.	Umwandlungstemperatur
Tri.	triklin
vac.	im Vacuum
var.	variabel

STOFF-EIGENSCHAFTS TAFELN

Den Haupttabellen folgend, findet man Seite 306 Stoff-Eigenschafts Tafeln. In jeder dieser Tafeln, in welcher die Stoffe durch ihre Indexzahlen bezeichnet sind, werden die Stoffe in aufsteigender Ordnung der Werte dieser Eigenschaften dargestellt. Die Intervalle an der Scala der Eigenschaftswerte sind in fettgedruckten Ziffern angegeben.

Die Erkennung eines Stoffes mit Hilfe seiner Eigenschaften. — Beispiel: Es ist eine Flüssigkeit gefunden, welche folgende Eigenschaften hat: Siede-Punkt 81.1° bei 745 mm, $d = 0.783$, $n_D = 1.344$. Welcher Stoff ist das? Mit Hilfe der Regel von Craft corrigiere man zuerst den Siede-Punkt auf 760 mm. Ist die allgemeine Natur des Stoffes nicht bekannt, setze man $c = 10^{-4}$ in die Gleichung von Craft ein: $\Delta t = cT_D(760 - P)$. Im gegenwertigen Falle ist also $\Delta t = 10^{-4} \times (81.1 + 273)(760 - 745) = 0.3^\circ$, wonach dann der Siede-Punkt $t_B = 81.1^\circ + 0.3^\circ = 81.4^\circ$ sich ergibt. Dann verwende man die Sd.P. Tabellen (Seite 310), die d-Tabellen (Seite 313) und die n -Tabellen (Seite 276), suche in diesen die Indexzahlen jener Stoffe heraus, deren oben genannte Eigenschaften solche Werte haben, die in der Nähe der Eigenschafts Zahlen des unbekannten Stoffes liegen. So erhält man für das gewählte Beispiel, folgende Indexnummern: für Sd. P. 130, 758, 727, 1612, 168, 277, 1535, 506, 792, für d , 208, 168, 395, 506, 3320, 1049, 262, 792, 5156; für n_D 141, 168, 213. Die einzige Index-Nummer, die alle drei Eigenschaften vereinigt, ist 168. Diese Index-Nummer wird in der Haupt C-Tabelle aufgesucht; mit Beachtung noch anderer Eigenschaften kann man leicht die Flüssigkeit als Azetonitril erkennen. Die Identifizierung kann dann noch weiter durch eine chemische Untersuchung, wenn nötig, bestätigt werden.

5. Punto di ebollizione. (Alla pressione di 760 mm Hg tranne che non sia altrimenti indicato dalla soprascritta; così 321¹² = bolle a 321° alla pressione di 125 mm Hg.)

Tabella 3.

6. Densità, g cm⁻³. (A 20°, tranne che non sia altrimenti indicato dalla soprascritta; così 1.853⁴⁰ = 1.853 g cm⁻³ a 40°C.)

Tabella 3.

7. Indici di rifrazione e dispersione (n_D e $H_D - H_a$) per 20° tranne che non sia altrimenti indicato.

ABBREVIAZIONI E CONVENZIONI

at. oppure atm.	atmosfera
C.	cubico o regolare
d.	si decompone; per es. d335 = si decompone a ca. 335°; 335d = fonde (o bolle) a 335° con decomposizione
diss.	una temperatura di dissociazione
exp.	esplode
l.	liquido
H.	esagonale
M.	monoclino
P.	sotto pressione
s.	sublimazione
s.d.	leggera decomposizione
R.	rombico od ortorombico
Tet.	tetragonale
Tr.	temperatura di trasformazione
Tri.	triclino
Trig.	trigonale
vac.	nel vuoto
var.	variabile

LE TABELLE DELLE PROPRIETÀ DELLE SOSTANZE

Seguendo le tabelle generali si troveranno (p. 306) le tabelle delle proprietà in ciascuna delle quali le sostanze, indicate col numero indice, sono disposte secondo l'ordine ascendente dei valori della proprietà. Gli intervalli nella scala dei valori della proprietà sono indicati in grassetto.

Identificazione di una sostanza a mezzo delle sue proprietà. —

Esempio: si supponga che un liquido abbia le seguenti proprietà: B.P. = 81.1° a 745 mm, $d = 0.783$, $n_D = 1.344$. Che sostanza è?

Con l'aiuto della regola di Craft, bisogna anzitutto ridurre il punto di ebollizione a 760 mm. Se non si conosce la natura della sostanza bisogna mettere, nella equazione di Craft, $c = 10^{-4}$, $t = cT_D(760 - P)$. Così, nel caso nostro, si avrebbe $t = 10^{-4} \times (81.1 + 273)(760 - 745) = 0.3^\circ$, e $t_B = 81.1^\circ + 0.3^\circ = 81.4^\circ$. Dopo bisogna guardare alle tabelle speciali per il B. P. (p. 310), per d (p. 313) e per n (p. 276), e rinviare da queste tabelle i numeri indici delle sostanze aventi valori delle suddette proprietà vicini a quelli della sostanza sconosciuta. Così, per il nostro esempio, si otterranno i seguenti numeri indici: per B.P., 130, 758, 727, 1612, 168, 277, 1535, 506, 792; per d , 208, 168, 395, 506, 3320, 1049, 262, 792, 5156; per n_D 141, 168, 213. L'unico numero indice comune a ciascuna di queste proprietà è 168; tornando a questo numero indice nella Tabella Generale C, e osservando le altre proprietà, si può prontamente identificare la sostanza nel acetoneitrile.

La identificazione può quindi essere ulteriormente comprovata da appropriati saggi chimici, se si desidera.

ELEMENTARY SUBSTANCES AND ATMOSPHERIC AIR. A-TABLE

THE GASEOUS STATE

Chem. symb.	Standard density (ρ , 10^{-3} g l ⁻¹)	Density of the saturated vapor at the normal boiling point (g l ⁻¹)	Critical constants					Specific heat joules per gram atom at 15°	Viscosity $\eta = A \times 10^{-4}$ poises
			t_c °C	p_c atm	d_c g cm ⁻³	C_p	A	t	
A	1.7824	5.89	-122.4	48.0	0.531	20.2	221	20	
As			>1400						
Br			302		1.18		155	20	
Cl	3.214		144	76	0.573	17.2	132	20	
F	1.695								
H	0.08987	1.33	-239.9	12.8	0.0310	14.5	88.7	20	
He	0.1785	(11.2)	-267.9	2.26	0.069	20.9	197	20	
Hg		0.020 at 320°	1650	3500	5		494	273	
I			553				184	124	
Kr	3.708	(8.3)	-62.6	54.2			248	20	
N	1.2508	4.61	-147.1	33.5	0.311	14.5	176.5	23	
Ne	0.0002	9.46	-228.7	26.9	0.484		312	20	
O	1.4290	4.74	-118.8	49.7	0.430	14.6	203.9	23	
O ₂		3.03 at -80°	-5.0	(67)	0.54				
P			721	100					
Rn	9.73	(12.6)	104.4	62.4			229	20	
S			1040						
Tl		14.8							
Xe	5.851	(9.7)	16.6	58.2	1.15		225	20	
Air	1.2930						244.2	20	

THE LIQUID STATE

Chem. symb.	Density g cm ⁻³		Thermal expansion $\frac{1}{\rho} \frac{d\rho}{dt} = A \times 10^{-4}$		Normal boiling point (t_b = "solid")	Latent heat of vaporization at t_b Kilo-joules per gram atom (L_v = "solid")
	d	t	A	at		
A	1.402	-185.7	4500	-183	-185.7	6.3
Ac					>1700	
Ag	9.4	960	110	900-1200	1950	249
Al	2.40	658	113	658-1100	1800	225
As					615 s	139 s
Au	17.	1063			2600	368
B					(2550)	
Ba					1140	361
Be					(1500)	
Bi	10.1	270	124	270-630	1150	193
Br	3.119	20	1100	0-30	58.78	15.0
C					4200	600
Ca					1170	399
Cb					>3300	
Cd	8.0	320	150	320-540	767	107
Ce					1400	
Cl	1.557	-33.6	1500	-34	-34.6	10.0
Co					2900	380
Cr					2200	320
Cs	1.84	26	370	27-123	670	73
Cu	8.3	1083	190	1083-1295	2300	467

THE LIQUID STATE.—(Continued)

Chem. symb.	d	t	A	at	t_b	L_v
F	1.11	-187.	3000	-200	-187.	(6.)
Fe	6.9	1530			3000	380
Ga	6.095	29.7			>1600	
Ge					(2700.)	(500.)
H	0.0709	-252.7	13000	-255	-252.7	0.450
He	0.126	-268.9			-268.9	0.10
	0.147	-270.8				
	d_{max}					
Hf					>3200	
Hg	13.546	20	182	20	356.90	59.2
I	4.00	107.	800	107-150	184.36	22.0
In					>1450	
Ir					>4800	
K	0.83	62.	290	62-150	760.	84.
Kr	2.6	140.			-151.8	(9.4)
La					1800	
Li			180	186-230	>1200	(170.)
Mg	1.57	650	380	650-800	1110	262
Mn					1900	240
Mo					3700	710
N	0.808	-195.8	6000	-195	-195.8	2.80
Na	0.93	97.5	280	100-200	880	105
Ne	1.204	-245.9			-245.9	1.74
Ni					2900	380
O	1.14	-183.	4100	-195	-183.00	3.418
O ₂	1.71	-183.	2000	-183	-112.	4.88
Os					>5300	
P	1.745	44.5	520	50-60	280	
Pb					(6200)	
Pd	10.3	327.	120	327-825	1620	193
Pt	19.	1755.			2200	
Ra					4300	520
Rb	1.475	38.5	340	40-140	(1140)	
Rh					700	74
Rn	4.4	-62.			>2500	
Ru					-61.8	(18.1)
S	1.808	115.	430	115	>2700	
Sh	6.55	631.	100	630-1050	444.6	8.98
Se					1380	190
Si					(2400)	
Sn	6.98	232.	100	232-1600	688	31
Sr					2600	170?
Ta					2260	325
Te					1150	383
Th					>4100	
Ti					1390	85
Tl	11.0	300.	140	300-350	>3000	
					>3000	
V					1650	120?
W						256?
Xe	3.06	-109.1			(3000)	
Yt					5900	910
Zn	6.7	463	150	419-543	-109.1	(13.4)
Zr					(2500)	
87					907	99.2
85					>2900	
					(620)	(69.6)
					(520)	(83.7)

Mole % O ₂ in liquid	<i>d</i>	<i>t</i>	Δ at <i>t</i> ^o	<i>t</i> _B	<i>L</i> _v
10	0.831	-195.0		-195.0	
20	.856	-194.3		-194.3	
20.94	.861	-194.2		-194.2	0.185 (pergram)
30	.898	-193.5		-193.5	
40	.932	-192.6		-192.6	
50	.974	-191.5		-191.5	

Chem. symb.	Specific heat joules per gram atom		Electrical resistivity ohm-cm $R = A \times 10^n$		
	C_p	t	A	n	t
A	22.4	-100.			
Ag	33.8	907-1100	17.0	-6	1000
Al	28	660	20.1	-6	637
Au	27.	1100	30.8	-6	1063
Bi	31.	400	127		269.
Br	36.	13-45	7.8	12	17
Cd	36	321	34	-6	400
Cl	33.5	0-24	>10	15	-70
Cs	32.	50	36.6	-6	28
Cu	27.	1084	21.3	-6	1083
Ga	23	119	27	-6	30
H	0.975	-252			
Hg	27.9	20	95.8	-6	20
I	8.01	114-185	78	6	110.5
In			29.	-6	155
K	30.	63	13	-6	62
Li			45.	-6	230
N	27.8	-200			
Na	32	100	9.7	-6	100.
Ni	33	1452	109		1500
O	26.4	-200			

Chem. symb.	C_p	t	A	n	t
P			2 3	6	25.
Pb			98.	- 6	400.
Rb	32.	50	23. 5	- 6	50.
S	30 4	100	95	10	115.
Sb	28	630	12	- 6	860.
Se			76 6	- 9	390.
Sn	31.	232	49.	- 6	300.
Tl			74.	- 6	300.
Zn			43	- 6	440.
Air	1 91*	-200			

* Per gram, for liquid containing 20.94 mole % O_2 .

Chem. symb.	γ dyne cm^{-1}	t	Chem. symb.	γ dyne cm^{-1}	t
A	12.5	-185.8	N	8.86	-195.8
Al	520	750	O	13.2	-183.
Bi	376	300	Pb	442.	350.
Br	36	58.6	S	60.	120.
Cd	628.	350	Se	72.	217.
Cl	27	-34.5	Air, with 50 mole % O_2	11.6	-190.3
Cu	358	30(CO_2)			
H	1.91	-252.7			
Hg	476	20			

Chem. symp.	n_D	t	Chem. symp.	n_D	t
B	2 5*		N	1 205 _a	-190.
Br	1 661	15	Na	0.0045	
Cd	0 82*		O	1 221	-181.
Cl	1 385	20.	Pb	2 6*	
H	1 097*	-252 8	S	1.929	110.
Hg	1 6-1 9	20	Se	2 9	220.
N	1 197 _a *	-195 8	Sn	2 1	

* These values are for the Hg line 5790 Å.

[illegible]

INTERNATIONAL CRITICAL TABLES

THE CRYSTALLINE STATE.—(Continued)

Chem. symb.	Crystal system	d	t	A at t°		t_F	C_p at t°		L_F	A	t
Ca	C.	1 5s	20	25	0-21	810	26 0	20		4 6	20
Cb		8 4	20			1950					
Cd	H.	8 6	20	29 8	20	320 9	28	20	6 2	7 5	20
Ce	C.	6 90	20			640	24 8	0 100		78	20
	H.	(6 7)									
Cl	R.	(1 9)				-101 6	28	-113	3 40		
Co	C.	8 9	20	12 3	20	1480	24 8	20	14 4	9 7	20
Cr	C.	7 1		8 2	20	161s	23	20	6 9	2 6	0
Cs		1 90	20	97	0-26	26	29	20	2 1	20	20
Cu	C.	8 92	20	16 6	20	1083	24 5	20	11 5	1 69	20
F		(1 3)				-223			(0 8)		
Fe	C.	7 8s	20	11 7	20	153s	24 9	20	11 2	10 0	20
Ga	Tet.	5 91	20	18	0 30	29 7s	23	12-23	5 5s	53	0
Ge	C.	5 3s	20			958 5	22 3	0-100		89×10^3	0
H	C.	0 0808	-262			-259 14	2 4	-260 6	0 059		
He						< -272 2					
Hf						(1700)					
Hg	H.?	14 19	-38 9	90	-190 to -40	-38 87	28.0	-40	2 33	21 3	-50
I	R.	4 93	20	93	20 100	113 5	27 8	20	8.38	1.3×10^{15}	20
In	Tet.	7 3	20	33	20	155	27 3	0 100		9	20
Ir	C.	22 4	20	6 5	20	2350	26 1	0-100		6	20
K	C.	0 86	20	83	20	62 3	29	14	2 3s	7 0	20
Kr		(2)				-169			(1 5)		
La		6 1s	20			826	26	0 100		59	18
Li	C.	0 53	20	56	20	186	23	0	(3 5)	9 3	20
Mn						(2300)					
Mg	H.	1 74	20	25 6	20	651	25	20	7 13	4 46	20
Mn		7 2	20	23	20	1200	24 6	0	8 4	5	
Mo	C.	10 2		1	20	2620 ± 10	26	20-100		4 77	20
N	C.	1 026	-252 5			-209 86	23	-212	0 356		
Na	C.	0 97	20	71	20	97 5	28 4	20	2 6s	4 6	20
Nd		6 9	20			840	27	0 100		79	20
Ne		(1 0)				-248 67			(0 24)		
Ni	C.	8 90	20	12 8	20	1452	25 8	20	18 17	6 9	20
O	H.	1 426	-252 5			-218 4	22 5	-221 8	0 22		
O ₃	Ozone					-251.					
Os	H	22 48	20	6 1	20	2700.	25	20 100		9	20
P	Yel. H.	1 82	20	12s	0-40	44 1	23	9	0 654	10^{17}	11
	Red. C.	2 20	20			500 _{atm}	24	-21 to +7			
	Black									710×10^3	0
Pb	C.	11 31	20	29 1	20	327 5	26 5	20	4 70	21 9	20
Pd	C.	12 0	20	11 8	20	1555	26 2	18	16	10 8	20
Po						(1800)					
Pr		6 5	20			940	27	0 100		88	18
Pt	C.	21 45	20	8 9	20	175s	26 5	20	22	10 5	20
Ra		(5)				(960)					
Rb		1 53	20	90	20	38 5	28 7	0	2 1s	12 5	20
Re						(3000)					
Rh	C.	12 5	20	8 1	20	195s	25	0-100		5 1	20
Rn		(1)				-71			(3 25)		
Ru	H.	12 2	20	9 1	20	2150	26	0 100		10	20
S	R.	2 07	20	64	40	112 8	23	0 30		2×10^{11}	20
	M.	1 96	20			119 0	24	0 30	1 1s		
Sa		7 7				> 1300					
Sb	H.	6 684	25	11 4	20	630 5	25	20	19 5	39	20
Se		(2 5)				1200					
Si	Gray, Trig.	4 80	25	37	40	220	28	0-41	(2.2)	1 2	20
	Red. H.?	4 50	25								
	C.	2 4	20	2 8 7 3	20	1420	20 7	20		$8s \times 10^3$	20
Sn	White, Tet.	7 31	20	20	20	231 8s	26 9	18	(7)	11 4	20
	Gray, C.?	5 750	20	5	-163 to -18		25 6	20			

THE CRYSTALLINE STATE.—(Continued)

Chem. symb.	Crystal system	d	t	A at t°		t_F	C_p at t°		L_F	A	t
Sr		2.6				800				23	20
Ta	C.	16.6		7	20	2850	27	20		15	20
Te	α Met. H.?	6.24	20	16.8	40	452	25	20	3.9	[5.8 - 33 $\times 10^3$]	
	β H.?	6.00	20								
Th	C.	11.2				1815	26.8	0-100		18	20
Ti	C.	4.5	20			1800	29	0-100		3	20
Tl	Tet.	11.85	20	28	20	303.5	26.6	20	6.15	18.1	20
U		18.7				<1850	28	0-100		60	20
V	C.	5.96				1710	24.6	0-100			
W	C.	19.3		4	20	3370	26	20-100		5.48	20
Xe		(2.7)				-140			(2.05)		
Yt		5.51				1490					
Zn	H.	7.140	20	33	20	419.43	25.3	20	7.1	6	20
Zr	C.	6.4	20			1700	25.2	0-100		170	0
85						(470)					
87						(23)					



CHEMICAL COMPOUNDS

B-TABLE

Compiled with the cooperation of Raleigh Gilchrist, F. W. Smithers and Edward Wichers, Bureau of Standards, Washington, D. C.; J. A. Almqvist, J. M. Brabam and E. W. Guernsey, Fixed Nitrogen Laboratory, Washington, D. C.; H. E. Merwin, H. S. Roberts, R. B. Sosman and E. G. Zies, Geophysical Laboratory, Washington, D. C.; John C. W. Frazer, F. O. Rice and H. C. Urey, Johns Hopkins Univ., Baltimore, Md.; Robert D. Coghill, Florence Fenwick, Donald M. Hetler, Norman W. Kruse and Hugh M. Spencer, Yale Univ., New Haven, Conn. The list of minerals was supplied by E. T. Wherry, Bureau of Chemistry, Washington, D. C.

General index number	Formula	Molecular weight (I. C. T. atomic weights, v. p. 43)	Crystal system	Normal melting point, °C	Specific gravity 20°/4° (or at other indicated temperature)	Refractive index finding number, v. p. 165
1	H ₂ O	18 0154		0	0 917° 1. 0 9982	203 8
2	H ₂ O ₂	34 0154		- 1 7	1 043 ₄ ^{4.46} 1. 1 442	16
3	H ₂ O ₂ ·2H ₂ O	70 0462		- 51		
4	HF	20 0077		- 83	1. 0 988 ^{13 8}	
5	Cl ₂ ·8H ₂ O	215 039	R.	d. 9 6	1 23	
6	ClO ₂	67 4580		- 76		
7	Cl ₂ O	86 9160		- 20?		
7 1	Cl ₂ O ₈	166 916		- 1	1 65	
8	Cl ₂ O ₇	182 916				
9	HCl	36 4657		-111	1. 1 194 ^{-85 8}	3
10	HCl·H ₂ O	54 4811		- 15.35	1 48	
11	HCl·2H ₂ O	72 4965		- 17 7	1. 1 46 ₄ ^{18 8}	
12	HCl·3H ₂ O	92 6119		- 24 4		
13	HClO ₄	100 466		-112	1. 1 768	
14	HClO ₄ ·H ₂ O	118 481		50	1 88 1. 1 776 ₄ ⁵⁰	
15	HClO ₄ ·2H ₂ O	136 497		- 17 8		
16	HClO ₄ ·3H ₂ O	154 512		- 43 2 (α) - 37 (β)		
17	HBr	80 9237		- 86	1. 2 16 ⁻⁶⁸	5
18	HBr·2H ₂ O	116 955		- 11	2 11 ⁻¹⁶	
19	HBr·3H ₂ O	134 970		- 47 5		
20	HBr·4H ₂ O	152 985		- 55 8		
21	HBrO	96 9237				
22	HBrO ₃	128 924		d. 100		
23	BrF ₃	136 916		5		
24	IO ₂	158 932		d. 130	4 2 ₁₀ ¹⁰	
25	I ₂ O ₅	333 864		d. 300	4 799 ₄ ¹⁸	
26	HI	127 940		- 50.8	1. 2 847 ^{-4.7}	27
27	HI·2H ₂ O	145 955		- 43		
28	HI·3H ₂ O	163 970		- 48		
29	HI·4H ₂ O	181 985		- 36.5		
30	HIO ₃	175 940	R.	110	4 629°	
31	HIO ₄	191 940				
32	HIO ₄ ·2H ₂ O	227 971	M. ?	d. 110		
33	I ₂ O ₄ ·HIO ₃	509 804		Tr. 170		
34	IF ₃	221 932		8	1. 3 5	
35	ICl (α)	162 390		27 2	1. 3 24 ₄ ¹⁴ 3 182 ₄ ²	
35 1	ICl (β)	162 390	R.	13 9	1. 3 24 ₄ ¹⁴ 1. 3 182 ₄ ²	
36	ICl ₃	233 306	R.	ca. 33	3 11 ¹⁵	
37	IBr	206 848		ca. 42	4 414 ¹⁰	

Ag 47 Al 13 Au 79 B 5 Ba 56 Bi 83 Br 35 C 6 Ca 20 Cd 48 Ce 58 Cl 17 Co 27 Cr 24 Cu 29 Dy 65 Ee 88 F 9 Fe 26 Gd 64 Ge 32 H 1 Oa 71 Os 76 Pt 78 Rf 101 Rh 45 Ru 44 Sb 51 Se 34 Sn 50 Sr 38 Ta 73 Te 52 Th 90 Ti 22 U 92 V 23 W 74 Y 39 Zr 40

TABLE: 8-1 TO 11-1

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Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
38	SO ₂	64 0650		- 72 7		15
39	SO ₃	80 0650		16 83	1. 1 923	
40	S ₂ O ₇	176 130		0		
41	H ₂ S ₂	34 0804		- 82 9	1. 0.96 ⁻⁶⁰	10
42	H ₂ S ₃	66 1454		- 88	1. 1.376	65
43	H ₂ S ₄	98 2104		- 53	1. 1 400 ¹⁹	
44	H ₂ S ₅	162 340			1. 1 71 ¹⁴	
45	H ₂ SO ₄	98 0804		10 49	1. 1.834	18
46	H ₂ SO ₄ ·H ₂ O	116 095		8 62	1. 1 842 ¹⁴	
47	H ₂ SO ₄ ·2H ₂ O	134 019		- 38 9	1. 1 650 ¹⁴	
48	H ₂ SO ₄ ·4H ₂ O	170 142		- 25		
49	H ₂ SO ₅	114 080		45		
50	H ₂ S ₂ O ₇	178 145		35	1. 1 9 ¹⁶	
51	H ₂ S ₂ O ₈	194 145		< 60		
52	SF ₆	146 065		- 55		
53	SO ₂ F ₂	86 0650		- 110		
54	SO ₂ F ₂	102 065		- 120 ^{mm}		
55	SO ₂ Cl ₂	102 981		- 78	1. 1 621 ¹⁴	56
56	SO ₂ Cl ₂	173 897		- 30		
57	S ₂ Cl ₂	135 046		- 80	1. 1 678	61
58	SOCl ₂	118 981			1. 1 638	52
59	SO ₂ Cl ₂	134 981		- 54 1	1. 1 667	22
60	SO ₂ ·SO ₂ Cl ₂	215 046		- 37 5	1. 1 837	
61	S ₂ O ₂ Cl ₄	253 962	R.	57 d.		
62	SO ₂ ·OHCl	116 531		- 80	1. 1 753	20
63	S ₂ Br ₂	223 962		- 46	1. 2 635	64
64	SOBr ₂	207 897		- 50	1. 2 68 ¹⁴	
65	SOClBr	163 439			1. 2 31 ⁹	
66	SeO ₂	111 200		340	3 953 ¹⁴	
67	HSe	80 2077				
68	H ₂ Se	81 2154		- 64	1. 2 12 ⁻⁴³	
69	H ₂ SeO ₃	129 215	H.	d.	3 004 ¹⁴	
70	H ₂ SeO ₄	145 215	H.	58	2 950 ¹⁴	
					1. 2 608 ¹⁴	
					2 627 ¹⁴	
					1. 2 356 ¹⁴	
71	H ₂ SeO ₄ ·H ₂ O	161 230		25		
72	SeF ₄	155 200		- 80		
73	SeF ₆	193 200				
74	SeCl ₄	221 032				
75	Se ₂ Cl ₇	229 316			1. 2 900 ¹⁷	
76	SeOCl ₂	166 116		8 5	1. 2 44	
77	Se ₂ Br ₂	318 232			1. 3 604 ¹⁴	
78	SeOBr ₂	255 032		41 7	1. 3 38 ¹⁰	
79	H ₂ SeO ₄ ·SO ₃	225 280		6 6		
80	H ₂ SeO ₄ ·2SO ₃	305 345		20		
81	SO ₃ ·SeCl ₄	301 097		165		
82	TeO ₂ —Tellurite	159 500	Tet. P.		Tet. 5 66 ⁹	
					R. 5 89 ⁹	1056
83	TeO ₃	175 500		d.	5 08 ¹⁰	
84	H ₂ Te	129 515		- 48	1. 2 57 ¹⁰	
85	H ₂ TeO ₄	193 515		d. 160	3.44 ¹⁰	
86	Te(OH) ₆ (α)	229 546	C.		3 053	
86.1	Te(OH) ₆ (β)	229 546	M.		3 071	
87	TeF ₆	241 500				
88	TeCl ₂	198 416		175		
89	TeCl ₄	269 332		214		
90	TeCl ₄ ·HCl·5H ₂ O	395 875		- 20		
91	TeBr ₂	287 332		ca. 280		
92	TeBr ₄	417 164		ca. 380	4.31 ¹⁴	
93	TeI ₄	635 228		259	8 403 ¹⁴	
94	2TeO ₃ ·SO ₃	399 065	R.	d. 500	4 7	
95	NO	30 0080		- 161	1. 1 269 ¹⁴	7
96	NO ₂	46 0080		- 9 3	1. 1 448	

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Rb Rh Ru S Sb Se Sn Sr Ta Te Th Ti Tl Tm U V W Y Yb Zn Zr
76 42 47 11 82 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 68 14 56 9 18 22 78 52 66 10 24 19 27 70 49 80 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
97	N ₂ O	44.0160		-102.4	1.1226 ⁻⁸⁹	2
98	N ₂ O ₃	76.0160		-102	1.1447 ²	
99	N ₂ O ₄	108.016	R.	30		
100	2N ₂ O ₄ ·H ₂ O	234.047		5	1.1.682 ¹⁰	
101	N ₂ O ₅	152.032				
102	NH ₃	17.0311		-77.7	0.817 ⁻⁷⁹	
					1.0.607	6
103	H ₂ N·NH ₃	32.0468		1.4	1.1.011 ¹⁸	28
104	N ₂ H ₄ ·H ₂ O	50.0622		< -40	1.1.03 ²¹	
105	N ₂ H ₄	43.0317		-80		
106	NH ₃ ·HN ₃	60.0628		110		
107	2NH ₃ ·H ₂ O	52.0776		-78		
108	N ₂ H ₄ ·HN ₃	75.0785		65		
109	HNO ₃	63.0157		-42	1.1.502	12
110	HNO ₃ ·H ₂ O	81.0311		-38		
110 1	HNO ₃ ·3H ₂ O	117.0619		-18.5		
111	NH ₂ OH	33.0311		34	1.35	
					1.1.204 ^{23, 6}	21
112	H ₂ NO ₄	81.0311	R.	-34		
113	NH ₂ OH	35.0465		-77		
114	H ₂ NO ₄	99.0465		-35		
115	(OH) ₄ NON(OH) ₄	180.078		-39		
116	NH ₂ NO ₂	62.0314		72 d.		
117	NH ₂ NO ₂	64.0468		d.		
118	NH ₂ NO ₂	80.0468	R.	169.6	α 1.66 ²⁴ β 1.725 ²⁵	
119	NH ₂ ONNOH	79.0625		65		
120	N ₂ H ₄ ·HNO ₃	95.0625		70.7		
				62.1		
121	NH ₂ NO ₃ ·HNO ₃	143.063		12		
122	N ₂ H ₄ ·2HNO ₃	158.078		104		
123	NH ₂ NO ₃ ·2HNO ₃	206.078		30		
124	NH ₂ NO ₃ ·3NH ₃	131.140		ca. -40		
125	NOF	49.0080		-134		
126	NO ₂ F	65.0080		-139		
127	NH ₂ F·HF	57.0465	R.		1.1.211 ¹²	
128	N ₂ H ₄ (HF) ₂	72.0622	C.	105		
129	NOCl	120.382			1.1.653	
130	NOCl	65.4660		-64.5	1.1.417 ⁻¹²	
131	NO ₂ Cl	81.4660		< -30	1.1.32 ¹⁴	
132	NH ₂ Cl—Sal ammoniac	53.4968	C.		1.536	145
133	N ₂ H ₄ ·HCl	68.5125		89		
134	N ₂ H ₄ ·2HCl	104.978	C.	198	1.42	
135	NH ₂ Cl·3NH ₃	104.590		10.7		
136	NH ₂ Cl·6NH ₃	155.683		-18		
137	NH ₂ OH·HCl	60.4968	M.	151	1.67 ¹⁷	
138	NH ₂ ClO ₄	117.497	R.	d.	1.95	489
139	N ₂ H ₄ ·HClO ₃	116.513		exp. 80		
140	N ₂ H ₄ ·HClO ₄ ·2H ₂ O	168.543		132		
141	NOBr	109.924		-55.5		
142	NOBr ₂	269.756		-40	1.2.637	
143	NH ₂ Br	97.9548	C.		2.548	
144	N ₂ H ₄ ·HBr	112.971		80		
145	HBr·2NH ₃	114.986				
146	NH ₂ Br·3NH ₃	149.048	R.	13.7		
147	NH ₂ Br·6NH ₃	200.141		-20		
148	NH ₂ I	144.971	C.		2.563	153
149	NH ₂ I ₂	270.895		-2	1.2.46 ¹⁸	
150	NH ₂ I ₃	308.835	R.		3.749	
151	NH ₂ I·NH ₃	162.002				
152	N ₂ H ₄ ·HI	159.987		exp. 127		
153	N ₂ H ₄ ·2HI	287.926		220		
154	NI ₂ ·NH ₃	411.835		d. > 20	3.5	

Ag Al As Au B Ba Be Bi Br C Ca Cl Cd Co Cr Co Cy Cs Cu Dy Er Eu F Fe Ga Gd Ge Gl H Hf Hg Ho I In Ir K La L Lu 32 55 13 33 54 79 75 15 5 18 77 51 29 50 4 44 46 88 31 67 69 64 3 43 25 85 20 75 2 73 30 68 6 26 36 83 58 81 72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
155	NH ₄ I.3NH ₃	196 064		- 8		
156	NH ₄ I.4NH ₃	213 095		- 5 1		
157	3NH ₄ I.2HI	352 020		90		
158	NH ₄ I.6NH ₃	247 157		28		
159	NH ₄ IO ₃	192 971	R.	d. 150	3 300 ¹¹	
160	NH ₄ IO ₄	208 971	Tet.	exp.	3 050 ¹¹	
161	2NH ₄ IO ₄ .H ₂ O	403 957	Tri.	exp. 150		
162	3NH ₄ OH.HI	227 033		101		
163	N ₂ S ₈	188 341		11	1 1 901 ¹²	
164	N ₂ S ₈	184 292	R.	178	2 22 ¹³	
165	N ₂ O ₃ .2SO ₃	236 146		230	2 14	
166	NH ₄ SH	51 1115				
167	(NH ₄) ₂ S	68 1426		d.		
168	NO ₂ SO ₃ H	127 081	R.	73 d.		
169	NH ₄ SO ₃ H	97 0961	R.	205 d.	2 03 ¹³	
170	NH ₄ (HSO ₄) ₂	115 112		146 9	1 78	
171	SO ₃ (NH ₄) ₂	96 112	R	92		
172	NH ₄ SO ₃ NH ₄	114 127		125		
173	N ₂ H ₄ .H ₂ SO ₄	130 127	R.	254	1 37	
174	(NH ₄) ₂ SO ₄ —Muscovite	132 143	R.	513 d.	1 709	602
175	(NH ₄ OH) ₂ .H ₂ SO ₄	164 143	M.	170		
176	(NH ₄) ₂ S ₂ O ₈	148 208	M.	d. 150		
177	(NH ₄) ₂ S ₂ O ₈	180 208	R.	d.		
178	(NH ₄) ₂ S ₂ O ₈	196 208	M.	d. 130		543
179	(NH ₄) ₂ S ₂ O ₈	228 208	M.	d. 120	1 982	
181	NH(SO ₃ NH ₄) ₂	179 223				
182	NH(SO ₃ NH ₄) ₂	211 223	M.	357	1 905	
183	(N ₂ H ₄) ₂ .H ₂ SO ₄	162 174		117		
184	NH ₄ SO ₃ F	117 104		245		
185	NSe	93 2080		exp. 200		
186	SeO ₂ (NO ₂) ₂	203 216		- 13		
187	NH ₄ HSeO ₄	162 247	R.	d.	2 162	
188	(NH ₄) ₂ SeO ₄	179 278	M.	d.	2 194	686
189	(NH ₄) ₂ SeBr ₆	594 774	C.		3 326	
190	(NH ₄) ₂ TeO ₄	227 578			3 01 ¹³	
191	P ₂ O ₃	110 048	M.	22 5	2 135 ¹¹	
192	P ₂ O ₄	126 048	R.?	> 100	2 537 ¹²	
193	P ₂ O ₄	142 048		563 var.	2 387	
194	P ₄ O	140 096			1 912 ¹⁴	
195	PH ₃	34 0471		- 132 5	1 0 746 ¹⁰	4
196	P ₂ H ₄	63 0557			1 83 ¹⁰	
197	P ₂ H ₄	66 0788			1 1 012	
198	P ₄ H ₂	281 231			1 95 ¹⁰	
199	P ₁₂ H ₄	378 334			1 83 ¹⁰	
200	H ₂ PO ₃	81 0394		35		
201	H ₂ PO ₂	66 0471			1 493 ¹¹	
202	H ₃ PO ₂	82 0471		73 6	1 651 ¹¹	
203	H ₃ PO ₄	98 0471		42 36	1 834 ¹⁰	
204	PF ₃	88 0240		- 160		
205	PF ₃	126 024		- 83		
206	POF ₃	104 024		- 68		
207	POCl ₃	137 398		- 111 8	1 1 574 ¹⁰	47
208	PCl ₄	208 314	Tet.	148 P.		
209	P ₂ Cl ₄	203 880		- 28		
210	POCl ₃	153 398		1 25	1 1 675	25
211	P ₂ O ₅ Cl ₄	251 880		< - 50	1 1 58 ⁷	
212	PH ₃ Cl	70 5128		28 ¹⁰ atm		
213	PF ₃ Cl ₂	158 940				
214	PBr ₃	270 772		- 40	1 2 852 ¹⁰	62
215	PBr ₃	430 604	R.			
216	POBr ₃	286 772		56	2 822	
217	PH ₂ Br	114 971		13	1 2 104	
218	POCl ₂ Br	197 856				

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Ru Rh S Se Sb Sn Sr Ta Te Th Ti Tl Tm U V W Y Yb Zn Zr
76 42 47 11 82 51 61 45 1 35 12 23 41 60 37 90 84 40 39 8 63 14 56 9 18 22 78 52 66 10 24 71 27 70 49 60 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
219	POClBr ₂	242.314		30	1.2.45 ¹⁰	
220	PI ₃	411.820	H.	61		
221	P ₂ I ₄	569.776	Tri.	110		
222	PH ₃ I	161.987				
223	P ₂ S ₃	158.243		290		
224	P ₂ S ₄	222.373		276	2.03	
225	P ₂ S ₄	285.462		298		
226	P ₂ S ₄	220.291		172.5	2.03 ¹⁷	
227	P ₂ S ₇	348.551		310	2.19 ¹⁷	
228	P ₂ S ₁₀	444.746		290		
229	P ₂ O ₃ S ₂	190.243		300		
230	P ₂ O ₃ S ₄	348.356		102		
231	PSF ₃	120.089		3.87.6at.		
232	PSCl ₂	169.463		— 35	1.1.635	193
233	PS ₂ Cl ₂	272.444		< — 17		
234	PSBr ₂	302.837		38	2.85 ¹⁷	
235	P ₂ SBr ₄	573.009		— 5		
236	P ₂ S ₂ Br ₄	477.907			1.2.262 ¹⁷	
237	PSCl ₂ Br	213.921		— 30	1.2.12 ⁹	
238	PSClBr ₂	258.379		— 60	1.2.48 ⁹	
239	P ₂ Si ₂	347.977		75		
240	P ₂ N ₄	163.112			2.51 ¹⁸	
241	NH ₄ H ₂ PO ₃	83.0782		100		
242	NH ₄ H ₂ PO ₃	99.0782		ca. 123		
243	NH ₄ H ₂ PO ₄	115.078	Tet.		1.803	250
244	N ₂ H ₄ H ₂ PO ₄	114.094		36		
245	N ₂ H ₄ H ₂ PO ₄	130.094		82		
246	(NH ₄) ₂ HPO ₄	118.091			1.619	
247	(N ₂ H ₄) ₂ H ₂ P ₂ O ₆	194.126		152		
248	(NH ₄) ₂ H ₂ P ₂ O ₆	196.141		170		
249	N ₂ H ₄ (H ₂ PO ₃) ₂	196.141		82		
250	P ₂ N ₄ Cl ₆	347.844	R.	114	1.98	
251	P ₂ N ₄ Cl ₆	463.792		123.5	2.18 ¹¹	
252	P ₂ N ₄ Cl ₆	579.740		41		
253	P ₂ N ₄ Cl ₆	695.688		91		
254	P ₂ N ₄ Cl ₆	603.322		237.5		
255	P ₂ N ₄ Cl ₆	811.636		< — 18		
256	PNBr ₂	204.864	R.	190		
257	PS ₂ NH ₄	145.258			1.1.78 ¹⁶	
258	As ₂ O ₃	197.920		275	3.71	
259	As ₂ O ₃ —Arsenite	197.920	C.		3.865 ²⁴	
260	As ₂ O ₃ —Arsenolite	197.920	C.		3.86	
261	As ₂ O ₃ —Claudetite	197.920	M.	316	4.15	160
262	As ₂ O ₃	229.920			4.086	986
263	AsH ₃	77.9831		—113.5		
264	AsF ₃	131.960			1.2.666 ⁹	
265	AsF ₃	169.960		— 80		
266	AsCl ₃	181.334		— 18	1.2.163	191
267	AsCl ₃	252.250	ca.	— 40		
268	AsBr ₃	314.708		32.8	1.3.540 ²⁵	
269	AsI ₃	455.756		146	4.39 ¹⁸	
270	AsI ₃	709.620		76	3.93	
271	As ₂ S ₃ —Realgar	214.050	M.	307 (β)	α 3.506 ¹⁹	1067
				Tr. 267	β 3.254 ¹⁹	
272	As ₂ S ₃ —Orpiment	246.115	M.	300	3.43	1071
				Tr. 170		
273	As ₂ S ₃	396.035			3.60 ¹⁹	
274	2AsSCLAs ₂ S ₃	531.081		120		
275	2AsI ₃ SL ₆	1705.17		72		
276	NH ₄ H ₂ AsO ₄	159.014	Tet.		2.311 ¹¹	283
277	(NH ₄) ₂ HAsO ₄	176.045	M.		1.989	
278	SbO ₂ —Cervantite	153.770	C.		4.07	174
279	Sb ₂ O ₃ —Valentinite	291.540	R.	656	5.87	1024

Ag	Al	As	Au	B Ba Be Bi Br				C Ca Cb Cd Co				Cl Cr Cs Cu				Dy Er Eu F Fe				Ga Gd Ge Gr H				Hf Hg Ho I In				Ir K La Li Lu									
83	55	13	33	56	79	75	5	10	77	51	29	59	4	44	46	85	31	67	69	64	3	43	25	65	20	75	2	73	20	68	6	26	36	63	58	51	72

B-TABLE: 14-1 TO 15-12

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Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
280	Sb ₂ O ₃ —Senarmonite	291 540	C.		5 2	178
281	Sb ₂ O ₃	323 540			3 78	
282	SbH ₃	124 793		— 88	1 2 26 ³⁴	
283	SbF ₃	178 770	R. ?	292	4 379 ³⁰	
284	SbF ₅	216 770		7	1 2 990 ³¹	
285	SbF ₅ ·2SbF ₃	574 310		390	4 188 ³¹	
286	SbCl ₃	228 144		73 4	3 140 ³⁴	
287	SbCl ₃	299 000		2 8	1 2 330	58
288	SbOCl	173 228		170 d.		
289	Sb ₂ O ₃ Cl ₃	637 906	M.		5 014	
290	SbF ₃ Cl ₃	266 144		55		
291	SbBr ₃	361 518		96 6	4 148 ³²	
292	SbI ₃	502 566	Trig. M. R.	167	1 3 845 ³²	
				Tr. 114	M. 4 768 ³²	
				(R. to Trig.)	Trig. 4 848 ³²	
				Tr. 125		
				(M. to Trig.)		
293	SbI ₃	756 430		79		
294	SbF ₃ I	343 702		ca. 80		
295	(SbF ₃) ₂ I	560 472		ca. 115		
296	Sb ₂ S ₃ —Stibnite	339 735	R.	550	4 64	1032
					red 4 120 ³⁰	
					gray 4 284 ³⁰	
					black 4 652 ³⁰	
					3 625 ³⁴	
297	Sb ₂ (SO ₄) ₃	531 735			4 6	1073
298	Sb ₂ O ₃ ·2Sb ₂ S ₃ —Kermesite	971 010	M.			
299	SbF ₃ S	248 835		230		
300	SbSe	200 970		542		
301	Sb ₂ Se ₃	481 140		611		
302	Sb ₂ Se ₄	682 110		605		
303	Sb ₂ Se ₅	883 080		590		
304	Sb ₂ Te ₃	626 040		620		
305	BiO	225 000			7 5	
306	BiO ₂	241 000			5 6	
306 I	BiO ₂ ·2H ₂ O	277 031		d 110	5 6	
307	Bi ₂ O ₃ (I)	466 000	R.	820	8 9	
308	Bi ₂ O ₃ (II)	466 000		Tr. 704	8 20	
309	Bi ₂ O ₃ (III)	466 000	R.	860	8 5	
310	Bi ₂ O ₃ ·3H ₂ O—Bismite	520 046	R.	d. 415	4 36	393
311	Bi ₂ O ₃	498 000			5 10	
312	HBiO ₃	258 008		d. 120	5.75	
313	BiF ₃	266 000			5 32	
314	BiOF	214 000			7 5	
315	BiCl	244 458		320		
316	BiCl ₂	315 374		230	4 7	
317	BiCl ₃	350 832		225		
318	BiOCl	260 458			7 72	
319	BiBr	288 916		287		
320	BiBr ₃	448 748		218	5 7	
321	BiOBr	304 916			8 08	
322	BiI ₃	580 796	H.	439	5 7	
323	BiOI	351 932	R.		7.92	
324	BiS	241 065		685	7.7	
325	Bi ₂ S ₃ —Bismuthinite	514 195	R.		7 39	
326	BiSe	288 200		625		
327	Bi ₂ Se ₃ —Guanajuatite	655 600	R.	710	6 82	
328	Bi ₂ Te ₃	800 500		573	7 7	
329	Bi ₂ TeO ₆ ·2H ₂ O—Montanite	677 531			3 79	1002
330	Bi ₂ Te ₂ S ₂ —Tetradymite	705 065	R.		7.5	
331	Bi(NO ₃) ₃ ·5H ₂ O	485 101	Tri.	d. 30	2.83	
332	Bi(NO ₃) ₃ ·6H ₂ O	503 116			2 76	
333	BiPO ₄	304 024	M.		3 23	

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Sb Se Si Sn Sr Ta Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
76 43 47 11 32 61 61 45 1 35 12 22 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 52 66 10 24 71 27 70 49 50 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
334	BiAsO_4	347 960	M.		7.14	
335	$\text{Bi}_2\text{As}_2\text{H}_2\text{O}_8$ —Atelestite	831 975	M.		6.4	1009
336	$5\text{Bi}_2\text{O}_3 \cdot 2\text{As}_2\text{O}_3 \cdot 9\text{H}_2\text{O}$?—Rhagite	2887 98			6.82	
337	CO	28 0000		—207	1.0.8138 ⁻¹⁰⁶	
338	CO_2	44 0000		—56 6 st 2st	1.53 ⁻⁷⁹	
					1.1.101 ⁻⁸⁷	
339	C_2O_2	68 0000		—107	1.114 ⁰	23

Compounds of C with elements of key numbers 2 to 15 in C-Table, p. 176

340	SiO_2 —Cristobalite	60 0600	C. Tet. ?	1710	2.32	228
341	SiO_2 —Lechatelierite	60 0600			2.20	24
342	SiO_2 —Quartz	60 0600	Trig.	<1470 m.	2.651	267
343	SiO_2 —Tridymite	60 0600	R.	1670	2.26	463
344	$\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Opal	60 0600			2.1 to 2.3	69, 82
345	SiH_4	32 0908		—185	1.0.68 ⁻¹⁰⁶	
346	Si_2H_6	62 1662		—132.5	1.0.69 ⁻⁸⁸	
347	Si_3H_8	92 2410		—117	1.0.725 ⁰	
348	Si_4H_{10}	122 317		—93.5	1.0.79 ⁰	
349	$\text{Si}_5\text{H}_8\text{O}$	78 1662		—144	1.0.881 ⁻⁸⁰	
350	SiF_4	104 060		—77		
351	SiH_2F_2	86 0677	ca. —110			
352	SiCl_4	169 892		—70	1.1.483	192
353	Si_2Cl_6	268 868		—1	1.1.58 ⁰	
354	Si_3Cl_8	367 844		—67		
357	$\text{Si}_4\text{Cl}_{10}$	466 820				
358	$\text{Si}_5\text{Cl}_{12}$	565 796				
359	$\text{Si}_6\text{Cl}_{14}$	664 772		170 s. d.		
360	Si_2OCl_2	284 868		—33		
361	$\text{Si}_2\text{O}_4\text{Cl}_2$	459 904				
362	$\text{Si}_4\text{O}_7\text{Cl}_{10}$	514 820				
363	$\text{Si}_6\text{O}_{10}\text{Cl}_{12}$	809 976				
364	SiH_3Cl	66 5411		—118	1.1.145 ⁻¹¹³	
365	SiH_2Cl_2	100 991		—122	1.1.42 ⁻¹²²	
366	SiHCl_3	135 442		—134	1.1.34	
367	SiBr_4	347 724		5	2.812 ⁰	190
368	Si_2Br_6	535 616		95		
369	Si_3Br_8	723 508		133		
370	$\text{Si}_4\text{Br}_{10}$	911 400		185 d.		
371	SiH_3Br	110 999		—94	1.1.533 ⁰	
372	SiH_2Br_2	189 907		—77	1.2.17 ⁰	
373	SiHBr_3	268 816		<—60	1.2.7 ¹⁷	
374	$\text{Si}_2\text{H}_5\text{Br}$	141 075		—100		
375	$\text{Si}_3\text{H}_7\text{Br}$	456 708		89		
376	SiCl_3Br	214 350		<—60		
377	SiCl_2Br_2	258 808		<—60		
378	SiClBr_3	303 206		—39	1.2.432	
379	SiI_4	535 788		120.5		
380	Si_2I_6	817 712		250		
381	SiH_3I	409 864		8	1.3.314	
382	SiCl_2I_2	261 366		<—60		
383	SiCl_3I	352 840		<—60		
384	SiClI_3	444 314		2		
385	SiBr_3I	394 740		14		
386	SiBr_2I_2	441 756		38		
387	SiBrI_3	488 772		ca. 53		
388	SiS	60 1250			1.853 ¹⁵	
389	SiS_2Cl_2	131 041		75		
390	SiCl_2SH	167 507				
391	SiSBr_2	219 957		93		
392	SiN	42 0680			3.17	
393	Si_3N_4	98.1440			3.64	
394	Si_2N_2	140 212			3.44	
395	$\text{Si}_3\text{N}_2\text{H}_4$	99 1517			2.015 ¹⁷	

Ag 23 Al 13 Au 33 B 5 Ba 79 Bi 15 Br 5 C 6 Ca 20 Cd 48 Co 59 Cl 44 Cr 52 Cu 63 Dy 69 Er 64 Fe 55 Ga 69 Gd 62 Ge 72 Hf 73 Hg 80 Ho 67 I 125 Ir 76 K 39 La 57 Li 3 Le 74

TABLE: 18-11 TO 19-12

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Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
396	$\text{Si}_2\text{H}_6\text{N}_2$	107.257			1.0895 ¹⁰⁴	
397	$\text{N}_2\text{H}_4\text{H}_2\text{SiF}_6$	176.122		186 d.		
398	$(\text{NH}_4)_2\text{SiF}_6$ —Cryptohalite	178.138	C.		2.01	68
399	$\text{SiBr}_4 \cdot 6\text{NH}_3$	449.911			2.307 ¹¹	
400	$\text{SiO}_2 \cdot \text{P}_2\text{O}_5$	202.108			3.1	
401	$3\text{SiO}_2 \cdot 2\text{Bi}_2\text{O}_3$ —Agricolite	1112.18	M.		6	904
402	$3\text{SiO}_2 \cdot 2\text{Bi}_2\text{O}_3$ —Eulytite	1112.18	C.		6.11	175
403	SiC—Carborundum	40.0600	II.	> 2700	3.17	110
404	$\text{Si}(\text{CH}_3)_2\text{H}$	46.1062		—156.4	1.062 ₄ ⁴⁷	
405	$\text{Si}(\text{CH}_3)_3\text{H}$	60.1216		—149.9	1.068 ₄ ⁶⁰	
406	$\text{Si}(\text{CH}_3)_4$	88.1524			1.0645 ^{11, 9}	
407	$\text{Si}(\text{CH}_3)_3(\text{C}_2\text{H}_5)$	102.168			1.0684	
408	$\text{Si}(\text{C}_2\text{H}_5)_2\text{H}$	116.183			1.0751 ⁹	
409	$\text{Si}(\text{CH}_3)_3[(\text{C}_2\text{H}_5)_2]$	116.183			1.07168	
410	$\text{Si}(\text{CH}_3)_2(\text{C}_2\text{H}_5)_2$	116.183			1.0701 ²¹	
411	$\text{Si}(\text{CH}_3)_2[(\text{C}_2\text{H}_5)_3]$	128.183			1.0804	439
412	$\text{Si}(\text{CH}_3)_2(\text{C}_2\text{H}_5)(\text{C}_4\text{H}_9)$	130.199			1.0732 ^{17, 6}	
413	$\text{Si}(\text{CH}_3)_2(\text{C}_4\text{H}_9)$	130.199			1.0721 ¹⁷	
414	$\text{Si}(\text{CH}_3)_2(\text{iso-C}_4\text{H}_9)$	130.199			1.0717 ¹⁸	
415	$\text{Si}(\text{CH}_3)_2(\text{C}_2\text{H}_5)_2$	144.214			1.0741 ^{17, 6}	
416	$\text{Si}(\text{CH}_3)_2(\text{C}_2\text{H}_5)(\text{iso-C}_4\text{H}_9)$	144.214			1.0743	
417	$\text{Si}(\text{CH}_3)_2(\text{iso-C}_4\text{H}_9)$	144.214			1.0731 ¹⁸	
418	$\text{Si}(\text{C}_2\text{H}_5)_4$	144.214			1.0706 ^{19, 6}	1036
419	$\text{Si}(\text{C}_2\text{H}_5)_3\text{H}$	158.229			1.0762 ¹⁸	
420	$\text{Si}(\text{C}_2\text{H}_5)_3(\text{C}_2\text{H}_5)$	158.229			1.0774 ¹⁷	
421	$\text{Si}(\text{C}_2\text{H}_5)_2(\text{C}_4\text{H}_9)$	172.245			1.0779 ¹⁸	
422	$\text{Si}(\text{C}_2\text{H}_5)_2(\text{iso-C}_4\text{H}_9)$	172.245			1.0781 ^{18, 6}	
423	$\text{Si}(\text{C}_2\text{H}_5)_2(\text{iso-C}_4\text{H}_9)$	186.260			1.0782 ¹⁸	
424	$\text{Si}(\text{C}_4\text{H}_9)_4$	336.214		233		
425	$\text{Si}_2(\text{C}_2\text{H}_5)_6$	146.259			1.0725 ^{19, 6}	
426	$\text{Si}(\text{OCH}_3)_4$	152.152			1.1028 ²²	9
427	$\text{Si}(\text{C}_2\text{H}_5)_3\text{OH}$	132.183			1.0871 ⁹	
428	$\text{Si}(\text{C}_2\text{H}_5)_2\text{OC}_2\text{H}_5$	160.214			1.0840 ⁹	
429	$\text{Si}(\text{OC}_2\text{H}_5)_4$	264.270			1.0915	1034
430	$\text{Si}(\text{C}_6\text{H}_5)_3\text{OH}$	276.183			1.178	
431	$\text{Si}(\text{C}_6\text{H}_5)_2(\text{CH}_2)_2\text{OH}$	318.229		106	1.177	
432	$\text{Si}_2\text{O}(\text{OC}_2\text{H}_5)_4$	426.443			1.0977 ^{22, 6}	1035
433	$\text{Si}(\text{CH}_3)_2\text{H}_2\text{Cl}_2$	80.5565		—134.1	1.0935 ₄ ⁶⁰	
434	$\text{Si}(\text{CH}_3)_2\text{HCl}_2$	115.007		—93	1.093 ₄ ⁶	
435	$\text{Si}(\text{C}_2\text{H}_5)_2\text{Cl}_2$	163.473			1.1230 ^{20, 6}	
436	$\text{Si}(\text{C}_2\text{H}_5)_2\text{Cl}_2$	177.488			1.1210 ¹⁰	1
437	$\text{Si}(\text{C}_2\text{H}_5)_2\text{Cl}_2$	157.053			1.1106 ₄ ⁶	
438	$\text{Si}(\text{C}_4\text{H}_9)_2\text{Cl}_2$	191.503			1.1162 ₄ ^{18, 6}	
439	$\text{Si}(\text{iso-C}_4\text{H}_9)_2\text{Cl}_2$	191.503			1.1154	
440	$\text{Si}(\text{C}_2\text{H}_5)(\text{C}_4\text{H}_9)\text{Cl}_2$	185.084			1.1042	
441	$\text{Si}(\text{C}_6\text{H}_5)_2\text{Cl}_2$	211.473			1.1326 ₄ ^{18, 6}	
442	$\text{Si}(\text{C}_6\text{H}_5)(\text{CH}_2)_2\text{Cl}_2$	225.488			1.1289 ₄ ^{19, 6}	
443	$\text{Si}(\text{C}_2\text{H}_5)(\text{C}_6\text{H}_5)\text{Cl}_2$	205.053			1.1159 ₄ ⁶	
444	$\text{Si}(\text{SCN})_4$	260.352		143.8		
445	TiO_2 —Anatase	79.9000	Tet.		3.84	407
446	TiO_2 —Brookite	79.9000	R.		4.17	1028
447	TiO_2 —Rutile	79.9000	Tet.	1646 d.	4.26	409
448	Ti_2O_3	143.800	Trig.		4.6	
449	TiF_4	123.900			2.708 ^{20, 1}	
450	TiCl_4	189.732		—30	1.1726	59
451	TiBr_4	367.564		39		
452	TiBrCl_3	234.190				
453	TiI_2	301.764			4.30	
454	TiI_4	555.628		150		
455	$\text{TiCl}_4 \cdot \text{SnCl}_4$	363.629		64		
456	Ti_3N_4	123.816		2930	5.18 ¹⁸	
457	TiP	78.9240			3.95 ₄ ¹⁸	
458	$\text{TiCl}_4 \cdot \text{PCl}_5$	327.130		85.5		

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pt Rb Ru Rh S Se Sb Sn Te Th Tl Ti Tm U V W Y Yb Zn Zr
76 42 47 11 82 51 61 45 1 35 12 23 41 60 37 80 84 40 29 8 63 14 56 9 18 22 78 82 66 10 24 19 27 70 49 50 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
459	TiCl ₄ ·POCl ₃	343 130		110		
460	TiCl ₄ ·2POCl ₃	496 528		107		
461	TiCl ₃	59 9000		3180	4.25	
462	Ti ₁₀ C ₂ N ₄	615 064			5.29	
463	Ti ₃ Si	123 860			4.02	
464	GeO ₂	104 380	R.		4.703	
465	GeH ₄	76 4108		-165	1.1.523 ⁻¹⁰⁰	
466	Ge ₂ H ₄	150 806		-109	1.1.98 ⁻¹⁰⁰	
467	Ge ₃ H ₄	225 202		-105 6	1.2.20 ⁻¹⁰⁰	
468	GeCl ₄	214 212		-49 5	1.1.874 ¹⁰	
469	GeHCl ₃	179 762				
470	GeBr ₄	392 044		26 1	1.3.132 ²⁰	
471	GeI ₄	580 108		144	4.322 ²⁰	
472	Ge(C ₂ H ₅) ₄	188 534		-90	0.991 ¹⁰	13

All Zr salts probably contaminated with 1-5% Hf

473	ZrO ₂ Baddeleyite	123 000	M.	2700	5.49	1012
473 1	ZrO ₂ (free from Hf)	123 000			5.73	
474	ZrF ₄	167 000			4.48	
475	ZrCl ₄	232 832				
475 5	ZrOCl ₂ ·8H ₂ O	322 039				274.5
476	ZrOS	139 065			4.87	
477	4ZrO ₂ ·3SO ₃	732 195			4.1	
478	4ZrO ₂ ·3SO ₃ ·15H ₂ O	1002 43	M.		2.5	
478 5	(NH ₄) ₂ ZrF ₆	278 034	C.			70.2
479	ZrP ₂	153 048			4.77 ²¹	
480	2ZrCl ₄ ·P ₂ O ₅	673 978		164.5		
481	ZrC ₂	115 000				
482	ZrSi ₂	147 120			4.88 ²²	
483	ZrO ₂ ·SiO ₂ Zircon	183 060	Tet.	2500	4.5	382, 387
484	SnO	134 700	C.		6.98	
485	SnO ₂ Cassiterite	150 700	Tet. H. R.		7.0	391
486	SnF ₄	194 700			4.78	
487	SnCl ₂	189 616		246.8		
488	SnCl ₄	260 532		-30.2	1.2.226	
489	H ₂ SnCl ₆ ·6H ₂ O	441 556			1.925 ²⁷	
490	SnBr ₂	278 532		215.8	5.12 ¹⁷	
491	SnBr ₄	438 364		31.0	1.3.34 ³⁰	
492	SnCl ₂ ·Br	304 990		-31	1.2.5 ¹³	
493	SnCl ₂ ·Br ₂	349 448		-20	1.2.8 ¹³	
494	SnClBr ₃	393 906		1	1.3.1 ¹³	
495	SnI ₂	372 564		320		
496	SnI ₄	626 428		143.5	4.46	
497	SnCl ₂ ·I ₂	443 480			1.3.29	
498	SnBr ₂ ·I ₂	532 396		50 d.	3.6	
499	SnS	150 765		880	5.080 ⁹	
500	SnS ₂	182 830			4.5	
501	SnSe	197 900		861	6.18 ⁹	
502	SnSe ₂	277 100			5.0	
503	SnTe	246 200		780	6.48	
504	SnCl ₄ ·2NOCl	391 404		180	2.6	
505	2NH ₄ Cl·SnCl ₄	367 526			2.4	
506	(NH ₄) ₂ SnBr ₆	634 274			3.50	
507	Sn ₄ P ₃	567 872			5.18	
508	SnCl ₄ ·POCl ₃	413 930		58		
509	Sn ₂ As ₃	462 280			6.56	
510	SnC ₂ O ₄	206 700			3.56 ¹⁸	
512	Sn(C ₂ H ₅) ₂	176 777			1.1.654	
513	Sn(C ¹ H ₃) ₄	178 792			1.1.314 ⁹	50
514	Sn(C ¹ H ₃) ₂ (C ² H ₅) ₂	206 823			1.1.232	
515	Sn(C ² H ₅) ₄	234 854			1.1.187 ²⁸	44
516	Sn(C ³ H ₇) ₂	272 777		225.7		

Ag 37 Al 13 As 33 B 54 Ba 70 Be 15 Bi 83 Br 81 C 12 Ca 40 Cd 112 Ce 140 Cl 35 Co 59 Cr 52 Cu 64 Dy 71 Ee 89 Eu 90 F 19 Fe 56 Gd 157 Hf 72 Hg 200 Ho 164 I 127 In 75 Ir 76 K 39 La 138 Li 7 Li 7 Le 72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
517	$\text{Sn}(\text{C}_2\text{H}_5)_4$	426 854		228		
518	$\text{Sn}_2(\text{C}_2\text{H}_5)_6$	411 631			1.1 412*	
519	$\text{Sn}(\text{C}_2\text{H}_5\text{O})_2$	236 746		182		
520	$\text{SnCl}(\text{C}_2\text{H}_5)_2$	241 274			1.1 428*	
521	$\text{SnBr}(\text{C}_2\text{H}_5)_2$	285 732			1.1 630	
522	$\text{SnI}(\text{C}_2\text{H}_5)_2$	290 701			1.2 109 ¹¹	
523	$\text{SnI}(\text{C}_2\text{H}_5)_4$	332 748			1.1 833 ¹¹	
524	PbO—Litharge	223 200	Tet.	888	9 58	423
525	PbO—Massicotite	223 200	R.		8 0	1068
526	PbO ₂ —Plattnerite	239 200	Tet.		9 375	417
527	Pb ₂ O ₃ —Minium	685 600			9.1	
528	PbF ₂	245 200		855	8 24	
529	PbCl ₂ —Cotunnite	278 116	R.	501	5 86	1016
530	PbCl ₄	349 032		— 15	1.3 18 ₁ ⁰	
531	Pb(ClO ₂) ₂	342 116		exp. 126		
532	Pb(ClO ₂) ₂	374 116			3 89	
533	Pb(ClO ₂) ₂ ·H ₂ O	392 131	M.	d. 110		
534	Pb(ClO ₂) ₂ ·3H ₂ O	460 162	R.	d. 100	2 6	
535	PbO·PbCl ₂ —Matlockite	501 316	Tet.	524 d.	7 21	1008
536	2PbO·PbCl ₂ —Mendipite	724 516	R.	693	7 08	1022
537	PbO·2PbCl ₂ —Penfieldite	779 432	H.			398
538	6PbO·PbCl ₂ —Lorettoite	1617 32	Tet.		7 6	418
539	PbCl ₂ ·PbO·H ₂ O—Laurionite	519 331	R.	d. 142	6 24	1006
540	PbCl ₂ ·PbO·H ₂ O—Parahaurionite	519 331	M.	d. 150	6.05	
541	2PbCl ₂ ·PbO·H ₂ O—Fiedlerite	797 447	M.	d. 150	5 88	1005
542	PbFCI	261 658	Tet.	601		
543	PbBr ₂	367 032	R.	373	6 66	
544	Pb(BrO ₂) ₂ ·H ₂ O	481 047	M.	d. 180	5.53	
545	PbO·PbBr ₂ ·H ₂ O	608 248	R.		6.72	
546	PbClBr	322 574			5 74	
547	PbI	334 132		d. 300		
548	PbI ₂	461 064	H.	402	6 10	
549	Pb(IO ₃) ₂	557 084		d. 300		
550	PbO·PbI ₂	684 204		300 d.		
551	PbI ₂ ·PbO·H ₂ O	702 280	R.	d. <100	6 83	
552	PbS—Galena	239 265	C.	1114	7 5	189
553	PbSO ₄ —Anglesite	303 265	R. M.	1170	6 2	981
				Tr. 864		
554	PbS ₂ O ₃	319 330			5 18	
556	PbS ₂ O ₆ ·4H ₂ O	439 392			3 22	311
557	Pb ₂ O(SO ₄)—Lanarkite	526 465	M.	977	6 92	995
558	PbSe—Chusthalite	286 400	C.	1065	8 10	
559	PbSeO ₄	350 400	R.	d.	6 37	
560	PbTe—Attaite	334 700	C.	917	8 16	
561	PbN ₆	291 248		exp. 350		
562	Pb(NO ₃) ₂	331 216	C. M.	470	4 53	162
563	2PbO·N ₂ O ₅ ·1.5H ₂ O	581 439	M.	d. 100		
564	4PbO·N ₂ O ₅ ·2H ₂ O	1112 86	R.	d. 100		
565	2PbO·N ₂ O ₅ ·H ₂ O	572 431	R.	d. 180	5 93	
566	(NH ₄) ₂ PbCl ₆	456 026	C.	d. 120		
567	Pb(PO ₃) ₂	365 248		800		
568	Pb ₃ P ₂ O ₇	588 448	R.	824	5.8	
569	3PbO·P ₂ O ₅	811 648		1014		389
				Tr. 782		
570	4PbO·P ₂ O ₅	1034 85		982		
571	5PbO·2P ₂ O ₅	1400 10		946		
572	8PbO·P ₂ O ₅	1927 65		860		
573	PbCl ₂ ·3Pb ₂ (PO ₄) ₃ —Pyromorphite	2713 06	H.	1156	6 8	1000
574	Pb(AsO ₂) ₂	421 120			5 85	
575	Pb(AsO ₃) ₂	453 120	H.		6 42	
576	Pb ₂ As ₂ O ₇	676 320		802	6 85	998
577	Pb ₂ (AsO ₄) ₂	899 520		1042	7 30	
578	Pb ₂ (AsO ₄) ₂ ·0.5H ₂ O	908 528			7.00	

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Re Rh Ru S Se Sb Sn Sr Ta Te Th Ti Tl Tm U V W Y Yb Zn Zr
76 42 47 11 82 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 23 78 52 66 10 24 19 27 70 49 50 44 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
579	5PbO.Pb ₃ (AsO ₄) ₂	2015 52		862		
580	5PbO.Pb ₃ (AsO ₄) ₂ .0.5H ₂ O	2024 53	R.		8 04	
581	10PbO.3As ₂ O ₃ .3H ₂ O	2975 81	H.		6 86	179
582	PbHAsO ₄	347 168	M.	d. >200	5 79	1054
583	Pb(H ₂ AsO ₄) ₂	489 151	Tri.	d. 140	4 46	963
584	Pb ₄ (PbOH) ₂ (AsO ₄) ₄	2040 26			7 08	
585	2Pb ₃ (AsO ₄) ₂ .2Pb(OH) ₂ .10H ₂ O	2461 62			7.1	
586	65PbO.21As ₂ O ₃ .12H ₂ O	19552 5		d. >200	7.10	
587	9PbO.3As ₂ O ₃ .PbCl ₂ Mimetite	2976 68	H.	1140		
				Tr. 395	7 13	399
588	4PbO.As ₂ O ₃ .2PbCl ₂ Fedemite	1646 15	R.		7 0	
589	3PbCl ₂ .3PbO.As ₂ O ₃ Georgiadessite	1733 87	R.	d.	7 1	
590	5PbO.2PbCl ₂ .As ₂ O ₃	1870 15	Tet.		7 14	
591	PbS.As ₂ S ₃ Sartorite	485 380	R.	<700 d.	4 6	
592	2PbS.As ₂ S ₃ Dufrenoyssite	724 645	R.		5 50	
593	3PbS.2As ₂ S ₃ Ruthite	1210 03	R.		5 41	
594	4PbS.As ₂ S ₃ Jordanite	1203 18	M.		6 10	
595	4PbS.3As ₂ S ₃ Baunhauerite	1695 41	M.		5 33	
596	7PbS.2As ₂ S ₃ Lengenbachite	2167 09	Tri.		5 8	
597	10PbS.3As ₂ S ₃ Guitermante	3131 00			5 94	
598	3PbO.Sb ₂ O ₃ Monimolite	1236 68	C.		6 58	
599	PbO.PbCl ₂ .Sb ₂ O ₃ Nadorite	792 856	R.		7 02	1059
600	PbS.Sb ₂ S ₃ Zinkenite	579 000	R.		5 3	
601	2PbS.Sb ₂ S ₃ Plumosite	818 265	M.		5 62	
602	3PbS.Sb ₂ S ₃ Dufeldite	1057 53			5 9	
603	3PbS.2Sb ₂ S ₃ Domingite	1397 27			5 62	
604	4PbS.Sb ₂ S ₃ Meneghinite	1296 80	R.		6 30	
605	5PbS.Sb ₂ S ₃ Geocronite	1536 06	R.		6 4	
606	5PbS.2Sb ₂ S ₃ Boulangerite	1875 80	R.		6 18	
607	5PbS.2Sb ₂ S ₃ Mullanite	1875 80	R.		6.3	
608	5PbS.4Sb ₂ S ₃ Plagionite	2555 27	M.		5 47	
609	6PbS.Sb ₂ S ₃ Kilbrickenite	1775 33			6 5	
610	PbS.Bi ₂ S ₃ Galenobismutite	753 460			6 9	
611	2PbS.Bi ₂ S ₃ Cosulite, Bjelkita	902 725	R.		6 6	
612	2PbS.3Bi ₂ S ₃ Chuvutite	2021 12			6 92	
613	3PbS.Bi ₂ S ₃ Lillianite	1231 90	R.		7 0	
614	4PbS.5Bi ₂ S ₃ Rezbanite	3528 04			6 2	
615	6PbS.Bi ₂ S ₃ Beegerite	1949 79	C.		7 27	
616	2BiSCl.PbS.Bi ₂ S ₃	1306 51		500 d.	6 42	
617	PbCO ₃ Cerussite	267 200	R.	d. 315	6 6	1001
618	PbC ₂ O ₄	295 200			5 28	
619	Pb(C ₂ H ₃) ₄	267 292		- 27 5	1. 1 095	42
621	Pb(C ₂ H ₃) ₄ (C ₂ H ₅) ₂	281 308			1. 1 889	43
622	Pb(C ₂ H ₃) ₂ (C ₂ H ₅) ₄	295 323			1. 1 790	48
623	Pb(C ₂ H ₃) ₃ (C ₂ H ₅) ₃	295 323			1. 1 760 ^{2.4}	37
624	Pb(C ₂ H ₃) ₄ (C ₂ H ₅) ₂	309 339			1. 1 712 ^{2.4}	46
625	Pb(C ₂ H ₃) ₃ (C ₂ H ₅) ₃	309 339			1. 1 674 ^{2.4}	34
626	Pb(C ₂ H ₃) ₃ (iso-C ₂ H ₅) ₃	309 339			1. 1 668 ^{2.4.5}	32
627	Pb(C ₂ H ₃) ₂ (C ₂ H ₅) ₄	323 354			1. 1 623 ^{2.4.6}	35
628	Pb(C ₂ H ₃) ₄	323 354			1. 1 659 ^{2.4}	51
629	Pb(C ₂ H ₃) ₂ (iso-C ₂ H ₅) ₂	323 354			1. 1 524 ^{2.4.6}	30
630	Pb(C ₂ H ₃) ₂ (C ₂ H ₅) ₂	337 369			1. 1 505 ^{2.4.6}	49
631	Pb(C ₂ H ₃) ₂ (C ₂ H ₅) ₂	351 385			1. 1 529 ^{2.4.6}	41
632	Pb(C ₂ H ₃) ₂ (iso-C ₂ H ₅) ₂	351 385			1. 1 504 ^{2.6}	33
633	Pb(C ₂ H ₃) ₂ (iso-C ₂ H ₅) ₂	351 385			1. 1 530 ^{2.4.6}	40
634	Pb(C ₂ H ₃) ₂ (iso-C ₂ H ₅) ₂	379 416			1. 1 430	31
635	Pb(C ₂ H ₃) ₂ (iso-C ₂ H ₅) ₂	379 416			1. 1 456 ^{2.4}	36
636	Pb(C ₂ H ₃) ₂ (C ₂ H ₅) ₂	365 400			1. 1 482	38
637	Pb(C ₂ H ₃) ₂ (iso-C ₂ H ₅) ₂	365 400			1. 1 506 ^{2.4.6}	39
638	Pb(C ₂ H ₃) ₄	515 354		227 7		
639	Pb(CHO) ₂	297 215	R.	d. 190	4 63	973
640	Pb(d-C ₄ H ₇ O ₄)	355 231			2 530 ¹⁹	
641	Pb(d-C ₄ H ₇ O ₄)	355 231	R.		3 871 ¹⁹	

Ag 27
Al 13
Au 79Ba 56
Be 4
Bi 83
Br 35Ca 20
Cd 48
Ce 58
Co 27Cr 24
Cu 63
Fe 56
Mn 25Dy 66
Er 68
Eu 63
F 9Ga 31
Ge 32
Hf 72
In 49Hg 80
I 53
Li 3
Na 11K 19
La 57
Lu 71
Zn 30

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
642	$\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$	325 246		280	3 251	
643	$\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$	379 292	M.	75	2 55	710
644	$\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 10\text{H}_2\text{O}$	505 400	R.	22	1 689	
645	$\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_4$	459 292		180	2 23 ¹⁰	
646	$\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_4$	515 354		132		
647	$\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$	437 369		74		
648	$\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$	465 400		91 5		
649	$\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$	493 431		84 5		
650	$\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$	521 416		95		
651	$\text{Pb}(\text{C}_{10}\text{H}_{19}\text{O}_2)_2$	549 493		100		
652	$\text{Pb}(\text{C}_{12}\text{H}_{23}\text{O}_2)_2$	605 554		104		
653	$\text{Pb}(\text{C}_{14}\text{H}_{27}\text{O}_2)_2$	661 616		107		
654	$\text{Pb}(\text{C}_{16}\text{H}_{31}\text{O}_2)_2$	717 677		112		
655	$\text{Pb}(\text{C}_{18}\text{H}_{35}\text{O}_2)_2$	769 708		ca 80		
656	$\text{Pb}(\text{C}_{18}\text{H}_{35}\text{O}_2)_2$	773 739		125		
657	$3\text{PbO} \cdot 2\text{CO}_2 \cdot \text{H}_2\text{O}$ —Hydrocerussite	775 615	H.	d. 400	6 14	395
658	$\text{PbCl}_2 \cdot \text{PbCO}_3$ —Phosgenite	545 316	Tet.		6 13	396
659	$\text{PbBr}_2 \cdot \text{PbCO}_3$	634 232	Tet.	d.	6 58	
660	$\text{Pb}(\text{OH})_2 \cdot \text{PbSO}_4 \cdot 2\text{PbCO}_3$ —Leadhillite	1078 88	M.		6 5	996
661	$\text{Pb}(\text{OH})_2 \cdot \text{PbSO}_4 \cdot 2\text{PbCO}_3$ —Maxite	1078 88	R.		6 9	
662	$\text{Pb}(\text{SCN})_2$	323 346	M.		3 82	
663	PbSiO_3 —Alamosite	283 200	M.	766	6 49	992
664	$2\text{PbO} \cdot \text{SiO}_2$	506 460		746		
665	$3\text{PbO} \cdot \text{SiO}_2$?	729 660		717		
666	$3\text{PbO} \cdot 2\text{SiO}_2$ —Barysilite	789 720	Trig.		6 72	304
667	SnPbS_2 —Teallite	390 630	R.		6 1	
668	ThO_2 —Thorianite	264 150	C.	>2800	9 69	182
669	ThCl_4	373 982	R.	820	4 59	
670	ThBr_4	551 814			5 67	
671	ThS_2	296 280		d.	6 8	
672	ThOS	280 215		d.	6 44	
673	$\text{Th}(\text{SO}_4)_2 \cdot 9\text{H}_2\text{O}$	602 419	M.	d.	2 77	
674	$\text{Th}(\text{PO}_4)_4$	548 246	R.		1 08	
675	ThC_2	256 150			8 96	
676	ThSi_4	288 270			7 96 ¹⁰	
677	$\text{ThO}_2 \cdot \text{SiO}_2$ —Thorite	324 210	Tet.		5 3	
678	GaCl_2	140 636		175		
679	GaCl_3	176 694		75 5	1 2 36 ¹⁰	
680	$(\text{NH}_4)_2\text{Ga}_2(\text{SO}_4)_2 \cdot 24\text{H}_2\text{O}$	992 147			1 77	89
681	In_2O_3	277 600	Trig.		7 179	
682	InCl_3	221 174			4 0	
683	$\text{In}(\text{ClO}_4)_3 \cdot 8\text{H}_2\text{O}$	557 297		80		
684	InI	241 732		351		
685	InI_2	368 664		212		
686	InI_3	495 596		199		
687	$\text{In}_2(\text{SO}_4)_3$	517 795			3 438	
688	$(\text{NH}_4)_2\text{InCl}_4 \cdot \text{H}_2\text{O}$	346 183	R.		2 281	
689	$(\text{NH}_4)_2\text{InBr}_6 \cdot \text{H}_2\text{O}$	568 473	R.		3 167	
690	$(\text{NH}_4)_2\text{In}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	511 154			2 011	88
691	Ti_2O	124 800		300		
692	Ti_2O_3	456 800		759	brown 9 65 ²¹ black 10 19 ²²	
693	TiOH	221 408				
694	$\text{Ti}(\text{OH})_4$	255 423		>340		
695	TiF	223 400				
696	TiCl	239 858		430	7.06	
697	$\text{TiCl}_3 \cdot 4\text{H}_2\text{O}$	382 836		37		
698	TiClO_4	287 858			5 0479	
699	TiClO_4	303 858		501	4 89	
700	TiBr	284 316		460	7 557 ¹⁷	
701	$\text{TiBr}_3 \cdot 4\text{H}_2\text{O}$	516 210		40		
702	$\text{TiBr}_3 \cdot \text{Cl} \cdot 4\text{H}_2\text{O}$	471 752		40 d.		
703	TiI	331 332		440	7.09 ¹⁴	

Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O	Os	P	Pb	Pd	Pr	Pt	Ra	Rb	Rh	Ru	S	Sa	Sb	Se	Si	Sn	Sr	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr	
76	42	47	11	82	51	61	45	1	35	12	23	44	60	37	80	84	40	39	8	63	14	56	9	18	22	78	82	66	10	24	19	27	70	49	50	48	67	71	28	21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
704	Tl ₂ S	440 865		448	8.0	
705	Tl ₂ S ₂	569 125		125		
706	Tl ₂ S ₃	185 966		127		
707	Tl ₂ SO ₄	504 865	R.	632		975
708	Tl ₂ S ₂ O ₈	568 930	M.		5.57	
709	TlHSO ₄	301 473		120 d.		
710	Tl ₂ Se	488 000		340		
711	Tl ₂ Se ₂ Tl ₂ Se ₂	1134 40		338		
712	Tl ₂ SeO ₄	552 000	R.		6 875	991
713	Tl ₂ Te	536 300		412		
714	Tl ₂ TeO ₄	600 300			5 712	
715	TlN ₃	246 424		334		
716	TlNO ₃	206 408	γ R. β Trig. α C.	206 Tr. 75 (γ to β) Tr. 145 (β to α)	5 556 ²¹ 4	1053
717	(NH ₄) ₂ TlCl ₆ ·2H ₂ O	507 295			2 380	
718	Tl ₃ P ₂ O ₇	708 224			6 86	
719	Tl ₃ P ₂ O ₇	991 648	M.	>120	6 786	
720	TlH ₂ PO ₂	269 439	M.	190		
721	TlH ₂ PO ₄	301 439	M.	190	4 723	
722	Tl ₂ H ₂ P ₂ O ₇	584 863		270		
723	Tl ₂ S ₂ As ₂ S ₂ —Lorandite	680 980	M.		5 53	1072
724	TlSbAs ₂ S ₂ —Vrbaitite	636 415	R.		5 30	
725	Tl ₂ CO ₃	468 800			7 11	
726	Tl(C ₂ H ₃ O ₂) ₂	263 423		110	3 68	
727	Tl(CH ₃ O) ₃	339 423	M.	95	1 3 9	
728	Tl(C ₂ H ₅ O) ₃	277 439		140	2 8	
729	Tl(<i>d</i> -C ₂ H ₅ O) ₃	353 439	R.		3 496	
730	Tl(<i>dl</i> -C ₂ H ₅ O) ₃	353 439	Tri.		3 494	
731	Tl(<i>meso</i> -C ₂ H ₅ O) ₃ ·0.5H ₂ O	362 446	Tri.		3 518	
732	TlH(C ₂ H ₃ O ₂) ₂	323 454		64		
733	Tl ₂ (<i>d</i> -C ₂ H ₅ O) ₃	550 831	Trig.		4 80	558
734	Tl ₂ (<i>meso</i> -C ₂ H ₅ O) ₃	556 831	Tri.		5 110	890
735	Tl ₂ (<i>dl</i> -C ₂ H ₅ O) ₃	556 831	M.	165	4 66	957
736	Tl ₂ (<i>d</i> -C ₂ H ₅ O) ₃ ·0.5H ₂ O...	565 838	M.		4 60	
738	TlH(C ₂ H ₃ CO ₂) ₂	530 156	Tet.		2 822 ¹³	
739	TlH(CBr ₃ CO ₂) ₂	790 904	M.		3 923 ¹³	
740	TlOC ₂ H ₂ (NO ₂) ₂ —Picrate	432 440	M. (red) Tri. (yellow)		3 164 ¹⁷ 2 993 ²⁵	
741	Tl(SbO)(<i>d</i> -C ₂ H ₅ O) ₂ ·H ₂ O	508 216	R.		3 990	
742	TlCl·2PbCl ₂	706 090	C.	435		
743	TlGa(SO ₄) ₂ ·12H ₂ O	682 435			2 477	110
744	ZnO—Zincite	81 3800	H.	>1800	5 606	392
745	ZnO	81 3800			5 47	
746	Zn(OH) ₂	99 3954	R.	d. 125	3 053	
747	ZnF ₂	163 380	M. Tri. ?	872	4 84 ¹⁸	
748	ZnF ₂ ·4H ₂ O...	175 442	R.	Tr. 100	2 535 ¹²	
749	ZnCl ₂	136 296	C.	365	2 91 ²³	
750	Zn(ClO ₄) ₂ ·4H ₂ O	304 357			2 15	
751	Zn(ClO ₄) ₂ ·6H ₂ O	372 388			2 15	
752	ZnBr ₂	225 212	R.	394	4 219	
753	ZnI ₂	319 244	C.	446	4 660 ¹⁴ 2	
754	Zn(IO ₃) ₂	415 244		d.	4 98	
755	ZnS(α)—Wurzite	97 4450	H.	1850 ¹⁵⁰⁰	4 087	404
756	ZnS(β)—Sphalerite	97 4450	C.	Tr. 1020	4 102 ²⁵	187
757	ZnSO ₄ —Zinkosite	161 445	R.	d. 740	3 74 ¹⁸	860
758	ZnSO ₄ ·H ₂ O	179 460		d. 238	3 28 ¹⁸	
759	ZnSO ₄ ·6H ₂ O	269 537	M.	Tr. 70 0	2 072 ¹⁵	
760	ZnSO ₄ ·7H ₂ O—Goslarite	287 553	R.	Tr. 39 0	1 97	490
761	ZnS ₂ O ₆ ·6H ₂ O	333 602	Tri.		1 915	
762	ZnSe	144 580	H.		5 42 ¹⁸	188.1

Ag	Al	Ar	Au	B	Ba	Be	Bi	Br	C	Ca	Cb	Cd	Ce	Cl	Co	Cr	Cs	Cu	Dy	Er	Eu	F	Fe	Ga	Gd	Ge	Gl	H	Hf	Hg	Ho	I	In	Ir	K	La	Li	Lu
55	13	33		84	79	73	15	5	16	77	51	29	59	4	44	46	85	31	67	69	64	3	43	25	65	20	75	2	73	30	68	6	26	36	53	55	81	72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{25}	Ref. ind. finding No.
763	ZnSeO ₄ ·5H ₂ O	298 657	Tri.	d. >50	2 501	
764	ZnSeO ₄ ·6H ₂ O	316 672	Tet.	d.	2 325	252
765	ZnTe	192 880	C.	1238 s	5 541 ¹⁰	188.2
766	Zn(NO ₃) ₂	189 396		44 07		
767	Zn(NO ₃) ₂ ·3H ₂ O	243 442		45 5		
768	Zn(NO ₃) ₂ ·6H ₂ O	297 488	Tet.	36 4	2 065 ¹⁴	
769	ZnCl ₂ ·NH ₃	153 377				
770	ZnCl ₂ ·2NH ₃	170 358	R.	210 s		
771	ZnCl ₂ ·2NH ₄ Cl	243 290	R.		1 82	
772	Zn(ClO ₄) ₂ ·4NH ₃	300 420		exp. 205	1 84	
773	ZnBr ₂ ·2NH ₄ Br	421 122			2 625	
774	Zn(BrO ₃) ₂ ·4NH ₃	389 336		exp. 169	2 27	
775	Zn(IO ₃) ₂ ·4NH ₃	483 368		exp. 215	2 82	
776	ZnSO ₄ ·(NH ₄) ₂ SO ₄	293 588			2 28	
777	ZnSO ₄ ·(NH ₄) ₂ SO ₄ ·6H ₂ O	401 680	M.	d.	1 931	516
778	Zn(SeO ₄)·(NH ₄) ₂ SO ₄ ·6H ₂ O	495 950	M.		2 20	620
779	Zn ₃ P ₂	258 188	C.	>420	4 55 ¹⁸	
780	Zn ₃ (PO ₄) ₂	386 188	R.	900	3 098 ¹⁸	
781	Zn ₃ (PO ₄) ₂ ·4H ₂ O— α Hopeite	458 250	R.	Tr. >105	3 04	734
782	Zn ₃ (PO ₄) ₂ ·4H ₂ O— β Hopeite	458 250	R.	Tr. >140	3 03	720
783	Zn ₃ (PO ₄) ₂ ·4H ₂ O—Parahopeite	458 250	Tri.	Tr. >103		793
784	ZnH ₄ (PO ₄) ₂ ·2H ₂ O	295 190	Tri.	100 d.		
785	Zn ₂ (OH)PO ₄ —Tarbuttite	242 792	Tri.		4 18	808
786	Zn ₃ (PO ₄) ₂ ·Zn(OH) ₂ ·3H ₂ O—Spencerite	539 630	M.	d. 100	3 14	755
787	Zn ₃ P ₂ S ₈	385 198	H.		2 2	
788	ZnAs ₂	215 300		771		
789	Zn ₃ As ₂	346 060	C.	1015		
790	Zn ₃ As ₂ O ₇	392 680			4 701 ²¹	
791	Zn ₃ As ₂ O ₈	474 060	R.		4 913 ¹⁸	
792	Zn ₃ (AsO ₄) ₂ ·8H ₂ O—Koettigite	618 183	M.	d. 100	3 309 ¹⁸	881
793	4ZnO·As ₂ O ₃ ·H ₂ O—Adamite	573 455	R.	d. >100	4 345	918
794	ZnCO ₃ —Smithsonite	125 380	Trig.	d. 300	4 44	369
795	ZnC ₂ O ₄	153 380			2 58 ^{17,18}	
796	ZnC ₂ O ₄ ·2H ₂ O	189 411		d. 100	2 562	
797	Zn(C ₂ H ₃) ₂	95 4262		— 40	1 1 380 ¹⁰	
798	Zn(C ₂ H ₃) ₂	123 457		— 28	1. 1 182 ¹⁸	
799	Zn(C ₂ H ₃) ₂	151 488				
800	Zn(180-C ₂ H ₁₁) ₂	207 549			1 1 022 ⁰	
801	Zn(C ₂ H ₃ O ₂) ₂	155 395			2 36	
802	Zn(C ₂ H ₃ O ₂) ₂ ·2H ₂ O	191 426	M.		2 205	
803	Zn(C ₂ H ₃ O ₂) ₂	183 426		142	1 840	
804	Zn(C ₂ H ₃ O ₂) ₂ ·2H ₂ O	219 457	M.	237	1 735	518
805	Zn(L-C ₄ H ₇ O ₄) ₂ ·2H ₂ O— <i>l</i> -Malate	367 488	Tet.		1 701 ²⁰	
806	Zn(C ₂ H ₃ CO ₂) ₂	239 488	M.			
807	5ZnO·2CO ₂ ·3H ₂ O—Hydrozincite	548 947	M ?		3 7	920
808	Zn(C ₂ H ₃ SO ₃) ₂ ·3H ₂ O—Ethane disulfonate	307 587	Tri.		2 043	
809	ZnC ₁₀ H ₆ O ₈ S ₂ ·6H ₂ O—1, 5-Naphthalene disulfonate	459 649	M.		1 793	791
810	Zn(C ₂ N ₂) ₂	117 396	R.	d. 800	3 52	
811	ZnO·SiO ₂	141 440		1437		
812	2ZnO·SiO ₂ —Willemite	222 820	Trig.	1509	1 3 86 gls	341
813	2ZnO·SiO ₂ ·H ₂ O—Calamine	240 835	R.		3 45	780
814	ZnSiF ₆ ·6H ₂ O	315 532	H.		2 104	209
815	ZnSiS	125 505			3 41	
816	ZnO·TiO ₂	161 280			3 17	
817	ZnO·3TiO ₂	321 080			4 921 ¹⁸	
818	3ZnO·2TiO ₂	403 940			3 83	
819	4ZnO·5TiO ₂	725 020			3 68 ¹⁹	
820	Tl ₂ Zn(SO ₄) ₂ ·6H ₂ O	774 402	M.	d. 120	3 720	771
821	CdO	128 410	C.		8 18	
822	Cd ₂ O	240 820		d.	8 192 ¹⁸	
823	Cd(OH) ₂	146 425	Trig.	d. 300	4 791 ¹⁸	

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Se Sb Sn Sm Sr Ta Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
76 42 47 11 82 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 76 52 66 10 24 19 27 70 49 80 48 57 71 28 31

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
824	CdF ₂	150 410	C.	1100	6.64	829
825	CdCl ₂	183 326	C.	568	4 047 ₄ ²⁴	
826	CdCl ₂ ·2.5H ₂ O	228 364	M.	Tr. 34	3 327	
827	Cd(ClO ₃) ₂ ·2H ₂ O	315 357		80		
828	CdCl ₂ ·CdO·H ₂ O	329 751	H.	d. 280	4 56 ₄ ¹⁸	
829	CdBr ₂	272 242		583	5.192 ₄ ²⁸	
830	Cd(BrO ₃) ₂ ·2H ₂ O	404 273	R.		3.758	
831	CdO·CdBr ₂ ·H ₂ O	418 667			4.87 ₄ ¹⁸	
832	CdI ₂ (α)	366 274	H.	388	5 670 ₄ ¹⁰	
832 1	CdI ₂ (β)	366 274			5 305 ₄ ¹⁰	
833	Cd(IO ₃) ₂	462 274			6 48	406
834	Cd(IO ₃) ₂ ·H ₂ O	480 289		Tr. 160	6 43	
835	CdS - Greenockite	144 475	H.	1750 ¹⁰⁰ at	4 820	
836	CdSO ₄	208 475	R.	1000	4 691 ₄ ²⁴	
837	CdSO ₄ ·H ₂ O	226 490	M.	Tr. 108	3 786	
838	CdSO ₄ ·2.66H ₂ O	256 583	M.	Tr. 41 5	3 090	
839	CdSO ₄ ·7H ₂ O	334 583	M.	Tr. 4	2 48	
840	CdS ₂ O ₆ ·6H ₂ O	380 632	Tri.	d.	2 272	
841	CdSe	191 610	H.		5 81 ₄ ¹⁸	
842	CdSeO ₄ ·2H ₂ O	291 611	R.	d. 100	3 632	
843	CdTe	239 910	C.	1041	6 20 ₄ ¹⁸	296
844	Cd(NO ₃) ₂	236 426		350		
845	Cd(NO ₃) ₂ ·4H ₂ O	308 488		59 4	2 455 ₄ ¹⁷	
846	CdCl ₂ ·NH ₄ Cl	236 823	R.		2 93	
847	CdCl ₂ ·4NH ₄ Cl	397 313	Trig.	Tr - 20	2 01	
848	CdCl ₂ ·2NH ₄ OH	249 388		d. 130	2 72 ₄ ¹⁸	
849	Cd(ClO ₃) ₂ ·6NH ₄	381 513		exp. 184	1 78	
850	Cd(BrO ₃) ₂ ·4NH ₄	436 366		exp. 192	2 53	
852	Cd(IO ₃) ₂ ·4NH ₄	530 398		exp.	3 23	
853	CdSO ₄ ·(NH ₄) ₂ SO ₄	340 618		d.	3 11	500
854	CdSO ₄ ·(NH ₄) ₂ SO ₄ ·6H ₂ O	448 710	M.	d. 100	2 067	
855	CdSeO ₄ ·(NH ₄) ₂ SeO ₄ ·2H ₂ O	470 918	Tri.		3 376	
856	CdSeO ₄ ·(NH ₄) ₂ SeO ₄ ·6H ₂ O	542 980	M.	d. 20	2 307	
857	Cd ₃ P ₂ O ₇ ·2H ₂ O	434 899		900	4 965 ₄ ¹⁸	
858	Cd ₃ (PO ₄) ₂	527 278		1500		
859	5CdO·2P ₂ O ₅ ·5H ₂ O	1016 22	M.	d. 550	4 13 ₄ ¹⁸	
860	Cd(H ₂ PO ₄) ₂ ·2H ₂ O	342 520	Tri.	d. 100	2 742 ₄ ¹⁵	
861	Cd ₃ (PO ₄) ₂ ·2CdHPO ₄ ·4H ₂ O	1016 22	M.	d. 600	4 06	
862	3Cd ₃ (PO ₄) ₂ ·CdCl ₂	1765 16			5 46 ₄ ¹⁸	
863	Cd ₃ As ₂ ...	487 150	C.		6 211	1027
864	Cd ₃ As ₂ O ₇	486 740			5 974	
865	CdHAsO ₄ ·H ₂ O	270 393		d. >120	4 164 ₄ ¹⁵	
866	Cd(H ₂ AsO ₄) ₂ ·2H ₂ O	430 392	Tri.	d. 75	3 241 ₄ ¹⁸	
867	CdSb...	234 180		455		
868	CdCO ₃	172 410	Trig.	d. <500	4 258	
869	CdC ₂ O ₄	200 410		d. 340	3 32 ₄ ¹⁸	
870	Cd(CH ₃) ₂	112 456				
871	Cd(CH ₃ O) ₂ ·2H ₂ O	238 456	M.		2 44	
872	Cd(C ₂ H ₅ O) ₂	171 433		256	2 341	
873	Cd(C ₂ H ₅ O) ₂ ·2H ₂ O	207 464	M.		2 01	390
874	Cd(CH ₃ SO ₃) ₂ ·2H ₂ O	336 602	Tri.		2 570	
875	Cd(CN) ₂	164 426		d. >200		
876	CdO·SiO ₂	188 470		1242	1.93	
877	2CdO·SiO ₂	316 880		1243		
878	HgO - Montroydite	216 610	R.	d. 100	11 14	
879	Hg ₂ O	417 220		d. 100	9.8	
880	HgF	219 610	C. ?	570	8 73	
881	HgF ₂	238 610	C.	645 d.	8 95	
882	HgCl - Calomel	236 068	Tet.	302	7.150	
883	HgCl ₂ - Corrosive sublimate	271 526	R.	277	5 44	390
884	HgClO ₄ ...	284 068	R.	d. 250	1. 4.44 ²⁰⁰	

Ag 87	Al 13	As 33	B 81	Be 9	Bi 83	C 12	Ca 20	Cb 21	Ce 58	Cl 17	Co 27	Cs 55	Cu 29	Dy 64	Er 68	F 9	Fe 26	Ga 31	Gd 64	Ge 32	H 1	Hf 72	Hg 80	Ho 67	I 53	La 57	Li 3	Lu 71	Mn 25	N 7	O 8	P 15	Rb 37	S 16	Sr 38	Ta 73	Tb 69	Tl 81	Tm 69	U 92	V 23	Xe 54	Y 39	Yb 70	Zn 30	Zr 40
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TABLE: 30-4 TO 31-4

121

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
885	HgClO ₄ ·6H ₂ O	408 160		d. 150	4 28	
886	Hg(ClO ₄) ₂ ·7H ₂ O	525 634		31 d.	2 78	
887	Hg ₂ ClO—Terlinguate	452 678	M.	d.	8 725	1070
888	HgCl ₂ ·2HgO	704 746	H.	d.	red 8 3	
889	HgO·2HgCl ₂	759 662	M.	d.	black 8 5	
890	Hg ₂ O·2HgCl—Eglestonite	889 356	C.		6 42	195
891	HgCl ₂ ·3HgO—Klemite	921 356	H.	d. 260	8 33	
892	HgCl ₂ ·4HgO	1137 97	H.		7 93	
893	HgBr	280 526			9 10	
894	HgBr ₂	360 442	R.	237	7 307	
895	HgBr ₂ ·4HgO	1220 88	R.	d. 230	6 05a	
896	HgI	327 542	Tet.	290 d	1. 5 12 ³⁰⁰	
897	HgI ₂ (red)	454 474	Tet.	Tr 127	8 73	
898	HgI ₂ (yellow)	454 474	R.	259	7 70	
899	Hg ₂ Cl ₂ I ₂	726 000	R.	153	6 283	
900	HgS—Metacinnabarite	232 675	C.		6 271	
901	HgS (α)—Cinnabarite	232 675	H.		1. 5 24 ¹⁰⁰	
902	HgS (β)	232 675	H.		7 50	411
903	HgSO ₄	296 675	R.	d.	8 10	
904	Hg ₂ SO ₄	497 285	M.	d.	7 73	
904 1	Hg ₂ SO ₄ Cl ₂	508 201		270	6 47	
904 2	Hg ₂ SO ₄ Br ₄	816 949		d. 125	7 56	
904 3	Hg ₂ SO ₄ I ₂	751 149		248		
905	HgSO ₄ ·3HgS	994 700		d. 120	6 416	
906	Hg ₂ SeO ₄	528 120		180 d		
907	HgNO ₂	246 618		d. 140	5 925	
908	HgNO ₃ ·H ₂ O	280 633	M.	70	4 785 ¹⁰	
909	Hg(NO ₃) ₂ ·0.5H ₂ O	333 634		79	4 3	
910	Hg ₂ (NO ₃) ₂ ·...	461 236		d. 100	7 33	
911	(HgOH) ₂ ·NH ₄ OH	468 267			4 083	
912	HgCl ₂ ·N ₂ H ₄ ·HCl	340 039		157		
913	HgCl ₂ ·2NH ₄ Cl·H ₂ O·...	396 535	R.		2 84	
914	HgCl ₂ ·12NH ₃	475 899		— 9 P.		
914 1	Hg ₂ (NO ₃) ₂ Cl ₄	667 068		d. 100		
915	HgBr ₂ ·2N ₂ H ₄ ·HBr·H ₂ O	603 475		73		
916	NHg ₂ Br·3NH ₄ Br	789 008	R.	180 d.		
916 1	Hg ₂ (NO ₃) ₂ I ₄	1032 96		250		
917	HgS·28b ₂ S ₄ —Livingstonite	912 145	R.		4 81	1020
918	Hg(C ₂ H ₅) ₂	230 656			1. 3 009	53
919	Hg(C ₂ H ₅) ₂	258 687			1. 2 444	54
920	Hg(C ₂ H ₅) ₂	286 718			1. 2 124 ¹⁰	
921	Hg(180-C ₄ H ₉) ₂	314 748			1 1 835 ¹⁰	
922	Hg(C ₆ H ₅) ₂	354 687		121 8	2 318	
923	Hg(C ₁₀ H ₇) ₂ —Mercury α-naphthyl	454 718		188	1 929	
924	Hg(C ₂ H ₅ O ₂) ₂	318 656		d.	3 270	
925	Hg(C ₂ H ₅ O ₂) ₂	346 687		110		
926	Hg(C ₂ H ₅ O ₂) ₂ ·...	442 687		105		
927	Hg(C ₁₅ H ₃₃ O ₂) ₂ —Oleate	763 118		103		
928	Hg ₂ (C ₁₅ H ₃₃ O ₂) ₂	547 297		225 d.		
929	Hg(C ₂ H ₅ Cl)	251 091		170	4 063	
930	Hg(C ₂ H ₅ Cl)	265 107		193	3 482	
931	Hg(C ₂ H ₅ I)	342 565		143		
932	Hg(C ₂ H ₅ S) ₂	322 817		77		
933	Hg(C ₂ N) ₂	252 626	Tet.		4 00	
934	CuO—Paramelaconite	79 5700			6 4	
935	CuO—Tenorite	79 5700	C.	d. 1026 ¹⁵⁴ mm O ₂	6 40	1078
936	Cu ₂ O—Cuprite	143 140	C.	1235 ¹⁰ 4 mm O ₂	6 0	188
937	CuF	82 5700		908		
938	CuF ₂ ·5HF·6H ₂ O	309 701	M.	d.	2 405	
939	CuCl—Nantokite	99 0280	C.	422	3 5a	173

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Rn Sb Rh Ru S Se Sn Sb So Se Sh So Re Ta Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
 76 43 47 11 82 31 61 45 1 35 12 23 41 60 37 90 84 40 39 8 63 14 56 9 18 22 78 63 66 10 24 19 27 70 49 50 48 67 71 25 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
940	CuCl ₂	134 486		49a	3 054	
941	CuCl ₂ ·2H ₂ O	170 517	R	110 d.	2 390 ¹² 4	883
942	Cu(ClO ₃) ₂ ·6H ₂ O	338 578	C. ?	65		
943	Cu(ClO ₃) ₂ ·7H ₂ O	388 594			1 955	
944	3Cu ₂ O·CuCl ₂ ·3H ₂ O—Atacamite	427 242	R.	d. 200	3 94	1033
945	3Cu ₂ O·CuCl ₂ ·3H ₂ O—Paratacamite	427 242	Trig.	d. 200	3 74	172
946	4Cu ₂ O·Cl ₂ O ₆ ·3H ₂ O	523 242	R. M. ?	d.	3 55	
947	CuBr	143 486	C.	504	4 72	
948	CuBr ₂	223 402	M.	498		
949	CuBr ₂ ·4H ₂ O	295 404	R.	Tr. 30		
950	Cu(BrO ₃) ₂ ·6H ₂ O	427 494	C.	d. 180	2 583	
951	CuI—Marshite	190 502	C. Tet.	605	5 62	186
952	Cu(IO ₃) ₂	413 434	M.	d.	5 241 ¹⁵	
953	Cu(IO ₃) ₂ ·H ₂ O	431 449	Tri.	d. 240	4 876 ¹⁵	
954	Cu(IO ₃)OH	255 510	R.	d. 290	4 878 ¹⁵	
955	Cu ₂ S—Covellite	95 6350	H. M. ?	Tr. 103	4 6	
956	Cu ₂ S—Chalcocite	159 205	R.	1100	5 6	
957	Cu ₂ S	159 205	C.	1130	5 783	
958	CuSO ₄ —Hydrocyanite	159 635	R.	200	3 6	
959	CuSO ₄ ·H ₂ O	177 650		d. 221	3 17	
960	CuSO ₄ ·3H ₂ O	213 681	M.		2 663	
961	CuSO ₄ ·5H ₂ O—Chalcantinite	219 712	Tri.	d. 20	2 286 ¹⁵ 4	641
962	CuSO ₄ ·7H ₂ O—Boothite	285 743	M.		1 944 ²¹	
963	Cu ₂ SO ₃ ·H ₂ O	225 220	H.		3 83 ¹⁵	
964	3Cu ₂ O·SO ₃ ·2H ₂ O—Antlerite	354 806	R.		3 9	921
965	Cu ₂ SO ₄ ·CuSO ₄ ·2H ₂ O	386 871		d. 150	3 57	
966	4Cu ₂ O·SO ₃ ·3H ₂ O—Brochantite	452 391	R.		3 907	944
967	4Cu ₂ O·SO ₃ ·4H ₂ O—Langite	470 407	R.		3 49	939
968	7Cu ₂ O·2SO ₃ ·5H ₂ O	807 197	R.		3 85	
969	20Cu ₂ O·SO ₃ ·2CuCl ₂ ·20H ₂ O—Connellite	2300 75	H.		3 4	350
970	Cu ₂ Se	206 340	C.	1113	6 749 ²⁰	
971	Cu ₂ Se ₂ —Umanigite	319 110			5 620	
972	Cu ₂ SeO ₃ ·2H ₂ O—Chalcomenite	226 801	M. R. ?		3 76	916
973	Cu ₂ SeO ₄ ·5H ₂ O	296 847	Tri.		2 559	
974	Cu(NO ₃) ₂ ·3H ₂ O	241 631		114 49	2 047	
975	Cu(NO ₃) ₂ ·6H ₂ O	295 678		26 4 d.		
976	4Cu ₂ O·N ₂ O ₅ ·3H ₂ O—Gerhardite	480 342	R.		3 43	903
977	CuCl ₂ ·2NH ₄ Cl	241 480			1 905 ¹¹ 4	
978	CuCl ₂ ·2NH ₄ Cl·2H ₂ O	277 510	Tet.	d. 110	1 98	354
979	CuCl ₂ ·3NH ₃	150 121		123		
980	2CuCl ₂ ·NH ₃	215 087		162		
981	2CuCl ₂ ·3NH ₃	219 149		144		
982	3CuCl ₂ ·10NH ₃	573 769		270		
983	Cu(ClO ₃) ₂ ·4NH ₃	298 610		d. 90	1 81	
984	CuBr ₂ ·2NH ₃	257 464		d. 200		
985	CuBr ₂ ·3NH ₃	194 579		115		
986	2CuBr ₂ ·3NH ₃	338 065		135		
987	Cu(BrO ₃) ₂ ·4NH ₃	387 526		exp. 140	2 31	
988	CuI ₂ ·3NH ₃	241 595		105		
989	2CuI ₂ ·3NH ₃	432 097		117		
990	Cu(IO ₃) ₂ ·5NH ₃	498 500		exp. 215	2 72	
991	(NH ₄) ₂ SO ₄ ·CuSO ₄	291 778			2 348	
992	(NH ₄) ₂ SO ₄ ·CuSO ₄ ·6H ₂ O	399 870	M.	d. 120	1 87	538
993	(NH ₄) ₂ SeO ₄ ·CuSeO ₄ ·6H ₂ O	494 110	M.		2 22	639
994	CuP	94 5940			5 11	
995	Cu ₂ P	158 164		d.	6 4	
996	Cu ₃ P ₂	252 758		d.	6 67	
997	4Cu ₂ O·P ₂ O ₅ ·H ₂ O—Libethenite	478 343	R.		3 7	932
998	4Cu ₂ O·P ₂ O ₅ ·2H ₂ O—Pseudolibethenite	496 359			4 0	
999	4Cu ₂ O·P ₂ O ₅ ·3H ₂ O—Tagilite	514 374			4 08	968
1000	5Cu ₂ O·P ₂ O ₅ ·2H ₂ O—Dihydrite	575 929	M. Tri.		4 2	940
1001	6Cu ₂ O·P ₂ O ₅ ·3H ₂ O—Phosphochalite	673 514			4 4	
1002	Cu(H ₂ PO ₃) ₂	193 649		exp. 90		

Ag 33 Al 13 As 33 Au 33 B 54 Be 75 Bi 15 Br 5 C 16 Ca 77 Cd 51 Ce 59 Cl 44 Co 44 Cr 46 Cu 31 Dy 67 Er 69 Eu 64 F 9 Fe 43 Ga 25 Gd 65 Ge 20 H 75 Hf 73 He 30 Ho 68 I 6 In 20 Ir 26 K 39 La 58 Lu 73

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1003	CuPO ₄ ·CuOH	239 172	R.			931
1004	Cu ₃ As—Domeykite	265 670	H.	830	8 00	
1005	3CuO·As ₂ O ₃ ·5H ₂ O—Trichalcite	558 707	R.			885
1006	4CuO·As ₂ O ₃ ·H ₂ O—Olivinite	566 215	R.		4 3	951
1007	4CuO·As ₂ O ₃ ·3H ₂ O—Leucochalcite	602 246	R.			960
1008	4CuO·As ₂ O ₃ ·7H ₂ O—Euchroite	674 308	R.		3 40	891
1009	5CuO·As ₂ O ₃ ·H ₂ O—Erinite	645 785			4 04	964
1010	6CuO·As ₂ O ₃ ·3H ₂ O—Clinoclaseite	761 386	M.		4 37	976
1011	7CuO·As ₂ O ₃ ·14H ₂ O—Chalcophyllite	1039 12	Trig.		2 06	306
1012	5CuO·As ₂ O ₃ ·9H ₂ O—Tyrolite	789 909	R.		3 05	912
1013	2Cu ₂ S·As ₂ S ₃	564 525			4 280	
1014	3Cu ₂ S·As ₂ S ₃ —Enargite	787 860	C.		4 40	
1015	3Cu ₂ S·2As ₂ S ₃ —Binnite	909 845	C.		4 48	
1016	Cu ₄ (AsO ₄) ₂ ·3NH ₄ ·4H ₂ O	591 785	Tri		3 05	
1017	Cu ₂ Sb (β)	312 480		687 Tr. 407 (β to α) 830	8 51 (β) 8 48 (α)	
1018	Cu ₂ Sb ₂	561 390				
1019	Cu ₂ S·Sb ₂ S ₃ —Chalcostibite	498 940	R.		4 932	
1020	Cu ₂ S·2Sb ₂ S ₃ —Guejarite	838 675	R.		4 814	
1021	3Cu ₂ S·Sb ₂ S ₃ —Stylotypite	817 350			5 147	
1022	Cu ₂ S·Bi ₂ S ₃ —Emplectite	673 400	R.		6 10 ¹⁸	
1023	5Cu ₂ S·2Bi ₂ S ₃ —Wittichenite	1824 42			5 9 ¹⁸	
1024	2Cu ₂ S·Bi ₂ S ₃ ·2BiSCl	1385 7			6 78	
1025	2Cu ₂ S·Bi ₂ S ₃ ·2BiSBr	1474 6			0 41	
1025 1	20CuO·Bi ₂ O ₃ ·5As ₂ O ₃ ·22H ₂ O—Mixite	3603 34			3 79	352
1026	2CuO·CO ₂ —Mysorine	203 140			4 308	
1027	2CuO·CO ₂ ·H ₂ O—Malachite	221 155	M.		4 0	977
1028	3CuO·2CO ₂ ·H ₂ O—Azurite	344 725	M.	d. 220	3 88	938
1029	Cu(CHO ₂) ₂	153 585			1 831	
1030	Cu(CHO ₂) ₂ ·4H ₂ O	225 647	M		1 795	652
1031	Cu(C ₂ H ₃ O ₂) ₂	181 616			1 930	
1032	Cu(C ₂ H ₃ O ₂) ₂ ·H ₂ O	199 632		115	1 882	667
1033	Cu(C ₂ H ₃ O ₂) ₂ ·2H ₂ O	217 647		d. 240	1 9	
1034	Cu(CH ₃ SO ₃) ₂ ·4H ₂ O—Ethane disulfonate	323 790	Tri.		2 001	
1035	CuC ₁₀ H ₄ O ₈ ·6H ₂ O—1, 5-Naphthalene disulfonate	457 839	M.		1 783	792
1036	CuCN	89 5780	M.	474 5		
1037	CuC ₂ O ₄ ·2NH ₃	185 632			2 305 ¹⁸ (α) 2 225 ¹⁸ (β) 2 840 ¹⁸ 1 021 ¹⁸	
1038	CuSCN	121 613			6 9 ¹⁸	
1039	Cu ₂ (NH ₃) ₂ (SCN) ₂	277 348	R.	d. 20	7 53	
1040	Cu ₂ Si	155 200		850		
1041	Cu ₂ Si	282 340		775		
1042	Cu ₂ Si ₂	373 970				
1043	CuO·SiO ₂ ·H ₂ O—Bisbeeite	157 645	R.			783
1044	CuO·SiO ₂ ·H ₂ O—Diopase	157 645	Trig.		3 05	319
1045	2CuO·2SiO ₂ ·H ₂ O—Shattuckite	297 275	M.			948
1046	6CuO·5SiO ₂ ·2H ₂ O—Planchette	813 751	M.		3 36	320
1047	CuSiF ₆ ·6H ₂ O	313 722	R.		2 158 ¹⁹	211
1048	CuCl ₂ ·PbO·H ₂ O—Pereylite	375 701	C.		4 67 ^{16 7}	176
1049	2CuO·5PbO·38O ₂ ·CO ₂ ·3H ₂ O—Linarite	1613 38	M.		5 4	967
1050	CuO·4PbO·P ₂ O ₅ —Tsaurite	1114 42	R.		6	987
1051	Cu ₂ S·2PbS·Bi ₂ S ₃ —Aikinite	1151 93	R.		6 45	
1053	5Cu ₂ S·2ZnS·2As ₂ S ₃ —Tennantite	1483 14	C.		4 4	198
1054	Cu ₂ HgI ₄	835 478			6 096 ¹⁸	
1055	CuCl ₂ ·HgS	331 703			6 20	
1056	Ag ₂ O	231 760	C.	d. 300	7 143 ^{16 6}	
1057	Ag ₂ O ₂	247 760		d. > 100	7 44	
1058	AgF	126 880	C.	435	5 852 ^{16 6}	
1059	AgCl—Cerargyrite	143 338		455	5 56	177
1060	AgClO ₄	191 338	Tet.	230	4 430	
1061	AgClO ₄	207 338		d. 486		
1062	AgBr—Bromyrite	187 796	C.	434	6 474	185

Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O	Os	P	Pb	Pd	Pr	Pt	Ra	Rb	Rh	Ru	S	Se	Sb	Sc	Si	Sn	Te	Ta	Tb	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr			
76	42	47	11	82	51	61	45	1	35	12	23	41	60	37	80	84	40	39	8	63	14	56	9	18	22	78	52	66	10	24	19	27	70	49	50	48	67	71	28	21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1063	AgBrO ₂	235 796	Tet.	d.	5.206	372
1064	AgI—Iodyrite	234 812	H.	d. 552	5.67	400
1065	AgIO ₃	282 812	R.	>200	5.525	
1066	Ag ₂ S—Acanthite	247 825	R.	825	7.326	
				Tr. 175		
1067	Ag ₂ S—Argenteite	247 825	C.	Tr. 175	7.317	
1068	Ag ₂ SO ₄	311 825	R.	652	5.45 ₄ ²⁹	
1069	Ag ₂ S ₂ O ₆ ·2H ₂ O	411 921	R.		3.61	844
1070	Ag ₂ Se—Naumannite	294 960		880	8.0	
1071	Ag ₂ SeO ₄	342 960			5.929	
1072	Ag ₂ Te—Hessite	343 260	C.	955	8.5	
1073	Ag ₂ N ₄	149 904		exp. 251.5		
1074	AgNO ₂	153 888	R.	d. 140	4.453 ²⁶	
1075	AgNO ₃	169 888	R.	212	4.352 ₁ ¹⁰	1050
1076	Ag ₂ (NO ₃) ₂	275 776		d. 110	5.75 ₃ ³⁰	
1077	AgNO ₂ ·NH ₃	170 919	Tet.	70 d		
1078	NH ₄ NO ₃ ·AgNO ₃	249 935	R.	109.6		
1079	Ag(NH ₃) ₂ NO ₃	203 950	R.	170 d		
1080	AgCl·AgNO ₃	313 226		160		
1081	2AgCl·3NH ₃	337 769	R.	68 d.		
1082	AgI·AgNO ₃	404 700	R.	94		
1083	AgI·2AgNO ₃	574 588	R.	119.1		
1084	AgBr·NH ₄ Br·4(NH ₄) ₂ S ₂ O ₈	878 580	Tet.			336
1085	Ag ₂ P ₂	308 832		d.	4.63	
1086	AgPO ₄	186 904		482	6.370	
1087	Ag ₃ PO ₄	418 664	C.	849	6.370 ₄ ²⁵	
1088	Ag ₄ P ₂ O ₇	605 568		588	5.300 ₇ ⁵	
1089	Ag ₃ HPO ₄	311 792	Trig.	d. 110		366
1090	Ag ₃ AsO ₄	446 600		150 d		
1091	Ag ₃ AsO ₄	462 600	C.		6.657 ₂ ²⁰	
1092	Ag ₃ AsBr ₂	638 348		d.	5.55 ₄ ²²	
1093	Ag ₃ S ₂ As ₂ S ₄ —Smithite	493 940	M.		4.700	1066
1094	Ag ₃ S ₂ As ₂ S ₄ —Treichmannite	493 940	Trig.		4.700	422
1095	3Ag ₃ S ₂ As ₂ S ₄ —Proustite	989 590	Trig.		5.49	412
1096	3Ag ₃ S ₂ As ₂ S ₄ —Xanthoconite	1053 72	R.		5.2	1030
1097	Ag ₃ S ₂ Sb ₂ S ₄ —Miargyrite	587 560	M.		5.36 ₁₇ ¹⁷	
1098	3Ag ₃ S ₂ Sb ₂ S ₄ —Pyrazgyrite	1083 21	Trig.		5.76	425
1099	3Ag ₃ S ₂ Sb ₂ S ₄ —Pyrostilpnite	1083 21	M. Tri.		5.790 ₁₇ ¹⁷	
1100	5Ag ₃ S ₂ Sb ₂ S ₄ —Stephanite	1578 86	R.		6.3	
1101	8Ag ₃ S ₂ Sb ₂ S ₄ —Polybasite	2322 34	R.		6.1	1031
1102	12Ag ₃ S ₂ Sb ₂ S ₄ —Polyargyrite	3313 64	R.		6.50	
1103	Ag ₂ S ₂ Bi ₂ S ₄ —Matildite	762 020	R.		6.9	
1104	Ag ₂ NO ₃ ·Bi(NO ₃) ₃ ·2NH ₄ NO ₃	629 006			3.055 ₁ ⁵	
1105	Ag ₂ CO ₃	275 760		218 d.	6.077	
1106	Ag ₂ C ₂ O ₄	303 760		exp. 140	5.029 ⁴	
1107	AgC ₂ H ₃ O ₂	166 903		d.	3.259 ¹⁴	
1108	AgC ₂ H ₃ O ₂ ·0.5H ₂ O—Lactate	205 995		100		
1109	Ag ₂ (dl-C ₄ H ₄ O ₆)	363 791		d.	3.432 ¹⁸	
1110	Ag ₂ (dl-C ₄ H ₄ O ₆)	363 791			3.775 ¹⁸	
1111	AgCN	133 888		320 d.	3.95	
1112	AgCNO	149 888		d.	4.00	
1113	AgCN·NH ₃	150 949	M.	102 d.		
1114	Ag(SbO)(dl-C ₄ H ₄ O ₆)·H ₂ O	364 886	R.		3.481 ¹⁸ ₂	
1115	4Ag ₂ S·GeS ₂ —Argyrodite	1127 81	C.		6.085 ¹⁵	
1116	4Ag ₂ S·SnS ₂ —Candfieldite	1174 13	C.		6.28	
1117	Ag ₂ S·2As ₂ S ₃ ·6PbS—Lengenbachite	2175 65	Tri.		5.8	
1118	3Ag ₂ S·4PbS·3Sb ₂ S ₃ —Diaphorite	2719 74	R.		5.9	
1119	3Ag ₂ S·4PbS·3Sb ₂ S ₃ —Freieslebenite	2719 74	M.		6.3	
1120	AgNO ₃ ·2TiNO ₂ ·Bi(NO ₃) ₃	1001 73			4.87 ₁ ¹⁴	
1121	AgCl·HgCl	379 406			0.495	
1122	2AgI·HgI ₂	924 098		Tr. 45	5.998 ₁ ⁹	
1123	4AgI·CuI—Miersite	1129 75			5.64	183
1124	Ag ₂ S·Cu ₂ S—Stromeyerite	407 030	R.		6.2	

Ag Al As Au B Ba Be Bi Br C Ca Ch Cd Co Cl Cr Cu Dy Er Eu F Fe Ga Gd Ge Gl H Hf Hg Ho I In Ir K La Li Lu
 32 55 13 33 54 79 75 15 5 16 77 61 39 59 4 44 46 83 31 67 69 64 3 43 25 65 20 75 2 73 30 68 6 26 36 59 68 81 72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1125	Au ₂ O	410 400		d. 20s		
1126	Au ₂ O ₃	426 400		d. 18s		
1127	Au ₂ O ₄	442 400		d. 16s		
1128	AuCl	232 658		d. 289 5	7 4	
1129	AuCl ₂	303 574		254 d	3 9	
1130	Au ₂ Cl ₄	536 232		d. 25s	5 1	
1131	AuBr	277 116		d. 115		
1132	AuBr ₂	436 948		16s d.		
1133	Au ₂ Br ₄	714 064		d. 115		
1134	AuHBr ₄ ·5H ₂ O	607 949		27		
1135	AuI	324 132		d. 120		
1136	Au ₂ S ₂	458 530		d. 14s		
1137	Au ₂ S ₃	490 595		d 197	8 754	
1138	Au ₂ Se ₂	632 000			4 6577	
1139	AuTe—Calaverite	324 700	Tri.		9 04	
1140	Au ₂ Te ₄	904 400		472		
1141	HAu(NO ₃) ₄ ·3H ₂ O	500 286		72 d.	2 84	
1142	Au ₂ O ₄ ·4NH ₄	510 524		exp. 143		
1143	Au ₂ P ₂	487 472			6 07	
1144	Au(CN) ₂ ·3H ₂ O	329 270		d. 50		
1145	4AuCl ₃ ·3AgCl·8NH ₄ Cl	2072 28	R.		7 91	159
1146	OsO ₂	222 800			4 91	
1147	OsO ₄ (yellow)	254 800	M.	41	1 4 41 ^{10 1}	57
1147 5	OsO ₄ (white)	254 800		39 5		
1148	OsF ₆	304 800				
1149	OsF ₈	342 800		34 5		
1150	(NH ₄) ₂ OsCl ₆	439 626	C.		2 93	
1151	(NH ₄) ₂ OsBr ₆	706 374			4 09	
1152	IrCl ₃	228 558		d. 798	10 18	
1153	IrCl ₂	264 016		d. 773		
1154	IrCl ₃ ·xH ₂ O	299 474		d 763	5 30	
1155	(NH ₄) ₂ IrCl ₆	441 926	C.		2 856	
1156	IrCl ₄ ·4NH ₃ ·H ₂ O	314 698	Trig.			327
1157	[Ir(NH ₃) ₅ Cl]Cl ₂	384 630	R.		2 675	
1158	[Ir(NH ₃) ₅ Br]Br ₂	518 004	R.		3 215 ^{10 1}	
1159	[Ir(NH ₃) ₅ Cl]Br ₂	473 546	R.		3 01	
1160	[Ir(NH ₃) ₅ I]I ₂	659 052	R.		3 580 ^{10 1}	
1161	[Ir(NH ₃) ₅ Cl]I ₂	567 578	R.		3 12	
1162	Ir ₂ (SO ₄) ₃ ·(NH ₄) ₂ SO ₄ ·24H ₂ O	1238 91	C.	106		
1163	PtCl ₂	266 146		d. 5-1	5 87	
1164	PtCl ₄ ·8H ₂ O	481 185			2 43	
1165	H ₂ PtCl ₆ ·6H ₂ O	518 086		60	2 431	
1166	PtBr ₄	514 894		d. 180		
1167	H ₂ PtBr ₆ ·9H ₂ O	838 880	M.	<100 d.		
1168	PtI ₄	702 958		d 100		
1169	PtS	227 295			8 897	
1170	PtSe ₂	353 630			7 65	
1171	PtSe ₃	432 830			7 15	
1172	Pt(NH ₃) ₄ (OH) ₂	297 370		110 d.		
1173	Pt(NH ₃) ₄ Cl ₂	300 208	R.	d 270		
1174	(NH ₄) ₂ PtCl ₆	441 056	C.		3 065	
1175	[Pt(NH ₃) ₄ Cl ₂ ·H ₂ O]	352 286	Tet.	d. 110	2 737	
1176	(NH ₄) ₂ PtBr ₆	710 804	C.		4 265	
1177	(NH ₄) ₂ PtI ₆	992 900	C.		4 61	
1178	PtP ₂ O ₇	369 278		d >600	4 856	
1179	PtAs ₂ —Sperrylite	345 150	C.	>800	10 60	
1180	[Pt(CO)Cl ₂] ₂	588 292		195		
1181	2PtCl ₂ ·3CO	616 292	M.	130		
1182	[Pt(CO)Br ₂] ₂	766 124	M.	182		
1183	[Pt(CO)I ₂] ₂	954 188		ca. 150 d.		
1184	[CH ₃ (C ₂ H ₅) ₂ SCl] ₂ PtCl ₄	618 308	M.	210		888
1185	[(C ₂ H ₅) ₂ SCl] ₂ PtCl ₄	646 339	M.			811

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Sb Se Si Sn Sr Ta Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
76 42 47 11 22 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 52 66 10 24 19 27 70 49 80 49 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. incl. finding No.
1186	$[(C_2H_5NH_2)_2H_2PtCl_4]$	500 117		218 d.	2 275 ¹⁸	139
1187	$[(CH_3)_2N]_2H_2PtCl_4$	528 148		245 d.	2 015	
1188	$[CH_3(C_2H_5)NH]_2H_2PtCl_4$	528 148		208	2 115 ¹⁸	
1189	$[C_2H_5NH_2]_2H_2PtCl_4$	528 148		214	2 218	
1190	$[(iso-C_4H_7)NH]_2H_2PtCl_4$	528 148		228	2 229	
1191	$[(CH_3)_2N]_2PtCl_4$	556 179	C.	278 d.	1 811 ¹⁸	
1192	$[CH_3(C_2H_5)NH]_2H_2PtCl_4$	556 179		200 d.	1 968 ¹⁸	
1193	$[(CH_3)_2C_2H_5N]_2PtCl_4$	584 210	C.	266 d.	1 762 ¹⁷	
1194	$[(C_2H_5)_2C_2H_5NH]_2H_2PtCl_4$	584 210		199	1 89	
1195	$[C_2H_5(iso-C_4H_7)NH]_2H_2PtCl_4$	584 210		180	1 885	
1196	$[C_2H_5(iso-C_4H_7)NH]_2H_2PtCl_4$	612 240		201 d.	1 804	115 130
1197	$[(C_2H_5)_2N]_2H_2PtCl_4$	612 240		100	1 903	
1198	$[(C_2H_5)_2N]_2H_2PtCl_4$	612 240		175 d.	1 704 ¹⁸	
1199	$[(CH_3)_2C_2H_5N]_2PtCl_4$	612 240	C.	252 d.	1 821	
1200	$[(CH_3)_2(iso-C_4H_7)N]_2PtCl_4$	612 240	C.	237	1 871 ¹⁸	
1201	$[(C_2H_5)(iso-C_4H_7)NH]_2H_2PtCl_4$	640 271		188	1 702 ¹⁸	
1202	$[(CH_3)(C_2H_5)_2N]_2PtCl_4$	640 271	C.	250 d.	1 731	
1203	$[(CH_3)_2(C_2H_5)(C_2H_7)N]_2PtCl_4$	640 271	C.	256 d.	1 812	
1204	$[(CH_3)_2(C_2H_5)N]_2PtCl_4$	640 271	C.	259 d.	1 795	
1205	$[(CH_3)_2(iso-C_4H_7)N]_2PtCl_4$	640 271	C.	220	1 751 ¹⁷	
1206	$[(CH_3)(C_2H_5)_2N]_2H_2PtCl_4$	640 271		>200	1 737	115 130
1207	$[(C_2H_5)_2N]_2PtCl_4$	668 302	C.	250 d.	1 776	
1208	$[(iso-C_4H_7)_2NH]_2H_2PtCl_4$	668 302		213	1 62 ¹⁸	
1209	$[(C_2H_5)_2(C_2H_7)_2N]_2H_2PtCl_4$	668 302		175	1 726	
1210	$[(CH_3)_2(C_2H_5)_2N]_2PtCl_4$	668 302	Tet.	250	1 745	
1211	$[(C_2H_5)_2(C_2H_7)_2N]_2PtCl_4$	696 333	C.	235 d.	1 710	
1212	$[(CH_3)(C_2H_5)_2(C_2H_7)_2N]_2PtCl_4$	696 333	C.	228 d.	1 712	
1213	$[(C_2H_5)_2(C_2H_7)_2N]_2PtCl_4$	724 364	C.	220 d.	1 677	
1214	$[(CH_3)(C_2H_5)(C_2H_7)(iso-C_4H_7)N]_2PtCl_4$	724 364		236 d.	1 637	
1215	$[(C_2H_5)_2(C_2H_7)_2N]_2PtCl_4$	724 364	C.	220	1 629 ¹⁸	
1216	$[(C_2H_5)_2(iso-C_4H_7)N]_2PtCl_4$	724 364	M.	215	1 602	115 130
1217	$[(C_2H_5)(C_2H_7)_2N]_2PtCl_4$	752 394	Tri.	212	1 571 ¹⁷	
1218	$[(C_2H_7)_2N]_2PtCl_4$	780 424	Tri.	199	1 515	
1219	$[(CH_3)(iso-C_4H_7)_2N]_2PtCl_4$	808 456	R. ?	174	1 696	
1220	$[(C_2H_5)(iso-C_4H_7)_2N]_2PtCl_4$	836 487	Tet.	170	1 562 ¹⁷	
1221	$[(C_2H_7)(iso-C_4H_7)_2N]_2PtCl_4$	864 518	C.	168	1 509	
1222	$Pt_2(N_2O)_2(C_6H_5S_2)_2$		Tschugneff and Chlopi n, 93, 82: 402; 12.			
1223	$PtSi$	223 290		1100	11 63 ¹⁸	
1224	Pt_2Si	418 520			13 8 ¹⁸	
1225	Pt_3Si_2	641 810			14 1	
1226	$PtPbCl_4 \cdot 4H_2O$	687 240	C.		3 681	115 130
1227	$PtPbBr_4$	881 926		d. >120	6 025	
1228	$PtZnCl_4 \cdot 6H_2O$	581 450	Trig.		2 717	
1229	$PtZnBr_4 \cdot 12H_2O$	956 291	Trig.		2 877	
1230	$PtZnI_4 \cdot 9H_2O$	1184 34	Trig.		3 689	
1231	$PtCdCl_4 \cdot 6H_2O$	628 480	Trig.		2 882	
1232	$PtCuCl_4 \cdot 6H_2O$	579 964	Trig.		2 734	
1233	RuO_4	133 700	Tet.		7 2	
1234	RuO_4	165 700		25 5	5 77 ¹⁰⁰	
1235	Ru_2S_4 - Laurite	299 595	C.		6 99	
1236	$RuSi$	120 760			5 4	115 130
1237	$[Rh_2(NH_3)_{10}Cl_2]Cl_4$	588 879	R.	d. 200	2 079 ¹⁸	
1238	$[Rh(NH_3)_4Br]Br_2$	427 814	R.		2 65	
1239	$[Rh(NH_3)_3]I_4$	568 862	R.		3 12 ¹⁸	
1240	$NH_4Rh(SO_4)_2 \cdot 12H_2O$	529 264	C.	103		
1241	$TiRh(SO_4)_2 \cdot 12H_2O$	715 625	C.			
1242	$RbRh(SO_4)_2 \cdot 12H_2O$	596 665	C.	109		
1243	PdO	122 700		d. 877		
1244	$PdCl_2$	177 616		500		
1245	PdI_2	340 564		d. 350		
1246	PdS	138 765		950		
1247	Pd_2S	245 465		800 d.	7.3	115 130
1248	$PdSe$	185 900		<960		

Ag 23
Al 13
As 33B 54
Ba 79
Be 78
Bi 15
Br 5C 10
Ca 77
Ch 51
Cl 29
Co 59Cr 4
Co 44
Cu 46
Ni 85
31Dy 67
Er 69
Eu 64
F 3
Fe 43Ga 25
Gd 65
Ge 20
Hf 75
2Hf 73
Hg 30
Ho 6
I 36Ir 36
K 53
La 58
Li 81
Lu 72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1249	$\text{Pd}(\text{NH}_4)_2\text{Cl}_2$	211 678	Tet.		2 5	
1250	$(\text{NH}_4)_2\text{PdCl}_4$	284 610	Tet.		2 17	
1251	$(\text{NH}_4)_2\text{PdCl}_4$	355 526	C.		2 418	
1252	$(\text{NH}_4)_2\text{PdSO}_4\text{Cl}_2 \cdot \text{H}_2\text{O}$	365 268	Trig.			316
1253	$\text{Pd}(\text{CO})\text{Cl}_2$	205 616		197		
1254	$\text{Pd}(\text{CO})_2\text{Cl}_2$	233 616		142		
1255	$2\text{PdCl}_2 \cdot 3\text{CO}$	439 232		132		
1256	PdSi	134 760			7 311 ¹⁵	
1257	$\text{ZnPdCl}_2 \cdot 6\text{H}_2\text{O}$	492 920	H.		2 359	
1258	MnO —Manganosite	70 9300	C.	1650	5 18	180
1259	$\text{MnO} \cdot \text{H}_2\text{O}$ —Pyrochroite	88 9454	Trig.		3 258 ¹⁴	340
1260	MnO_2 —Polianite, Pyrolusite	86 9300	R.		5 028	
1261	$\text{MnO}_2 \cdot \text{H}_2\text{O}$	104 945	C.			171
1262	Mn_2O_3	157 860	C.		4 50	
1263	$\text{Mn}_2\text{O}_3 \cdot \text{H}_2\text{O}$ —Manganite	175 875	R.		3 258	1058
1264	Mn_2O_3 —Hausmannite	228 790	Tet.		4 700	121
1265	MnF_2	92 9300		856	3 98	
1266	MnF_3	111 930			3 54	
1267	$\text{MnF}_3 \cdot 5\text{HF} \cdot 6\text{H}_2\text{O}$	301 061			1 921	
1268	MnCl_2 —Scacchite	125 846	C.	650	2 977 ¹⁴	
1269	$\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$	197 908	M.	58 01	2 01	
1270	$\text{Mn}(\text{ClO}_4)_2 \cdot 8\text{H}_2\text{O}$	397 969			1 99	
1270.1	$\text{MnCl}_2 \cdot 3\text{MnO}_2 \cdot 3\text{H}_2\text{O}$ —Kempite	440 682	R.		2 04	889
1271	MnBr_2	214 762			4 385 ¹⁵ fused	
1272	$\text{MnBr}_2 \cdot 4\text{H}_2\text{O}$	285 820	M.	64 3d		
1273	MnS —Alabandite	86 9950	C.	d.	3 99	197
1274	MnS_2 —Hauerite	119 060	C.		3 403	106
1275	MnSO_4	150 995		700	3 25	
1276	$\text{MnSO}_4 \cdot \text{H}_2\text{O}$ —Szmikite	169 010	M. ?		2 954	742
1277	$\text{MnSO}_4 \cdot 2\text{H}_2\text{O}$	187 026			2 520	
1278	$\text{MnSO}_4 \cdot 3\text{H}_2\text{O}$	205 041			2 356	
1279	$\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$	223 057	M. R.		2 107	
1280	$\text{MnSO}_4 \cdot 5\text{H}_2\text{O}$	241 072	Tri.		2 103	
1281	$\text{MnS}_2\text{O}_6 \cdot 6\text{H}_2\text{O}$	323 152	Tri.		1 757	
1282	MnSe	134 130	C.		5 591 ¹⁵	
1283	$\text{MnSeO}_4 \cdot 2\text{H}_2\text{O}$	234 161	R.		2 910	
1284	$\text{MnSeO}_4 \cdot 5\text{H}_2\text{O}$	288 207	Tri.		2 334	
1285	Mn_3N_2	302 666			6 63	
1286	$\text{Mn}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$	232 992		34 81		
1287	$\text{Mn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$	287 038		25 8	1 82	
1288	NH_4MnO_4	136 969	R.		2 208 ^{10 14}	
1289	$(\text{NH}_4)_2\text{SO}_4 \cdot \text{MnSO}_4 \cdot 6\text{H}_2\text{O}$	391 229	M.		1 831	484
1290	$(\text{NH}_4)_2\text{SO}_4 \cdot 2\text{MnSO}_4$	434 133	C.		2 501 ¹⁴	
1291	$(\text{NH}_4)_2\text{SO}_4 \cdot \text{Mn}_2(\text{SO}_4)_3$	530 196			2 401 ¹¹	
1292	$(\text{NH}_4)_2\text{SeO}_4 \cdot \text{MnSeO}_4 \cdot 6\text{H}_2\text{O}$	485 500	M.		2 093	
1293	Mn_3P_2	391 628			4 94	
1294	$\text{Mn}_2\text{P}_2\text{O}_7$	283 908	M.		3 707 ¹⁴	897
1295	$3\text{MnO} \cdot \text{P}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$ —Reddingite	408 884	R.		3 1	842
1296	$3\text{MnO} \cdot \text{P}_2\text{O}_5 \cdot 4\text{H}_2\text{O}$ —Stewartite	426 898	Tri.		2 94	846
1297	$5\text{MnO} \cdot 2\text{P}_2\text{O}_5 \cdot 4\text{H}_2\text{O}$ —Palaite	710 808	M.		3 17	843
1298	$5\text{MnO} \cdot 2\text{P}_2\text{O}_5 \cdot 5\text{H}_2\text{O}$ —Hureaulite	728 823	M.		3 18	835
1299	$3\text{MnO} \cdot \text{As}_2\text{O}_3$ —Armangite	442 710	H. R.		4 23	
1300	$4\text{MnO} \cdot \text{As}_2\text{O}_3 \cdot \text{H}_2\text{O}$ —Sarkinite, Polysenite	531 655	M.		4 15	954
1301	$\text{Mn}_2\text{O}_3 \cdot 4\text{MnO} \cdot \text{As}_2\text{O}_3 \cdot 4\text{H}_2\text{O}$ —Flinkite	743 562	R.		3 87	959
1302	$6\text{MnO} \cdot \text{As}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ —Hemafibrite	745 577	R.		3 6	980
1303	$7\text{MnO} \cdot \text{As}_2\text{O}_3 \cdot 4\text{H}_2\text{O}$ —Allactite	798 492	M.		3 84	945
1304	MnSb	176 700			5 01 ¹⁷	
1305	$10\text{MnO} \cdot \text{Sb}_2\text{O}_3$ —Manganostibite	1032 84	M.			989
1306	Mn_3C	176 790			6 89 ¹⁷	
1307	MnCO_3 —Rhodochrosite	114 930	Trig.		3 125	368
1308	$\text{Mn}_2\text{C}_2\text{O}_4$	142 930			2 482 ¹⁷	
1309	$\text{Mn}(\text{CHO}_2)_2$	144 045			2 205	

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Ru S Sb Se Sn Sr Ta Tb Te Th Ti Tl Tm U V W Yb Zn Zr

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1310	Mn(CHO ₃) ₂ ·2H ₂ O	180 976	R.		1 953	
1311	Mn(C ₂ H ₃ O ₂) ₂	172 976			1 74	
1312	Mn(C ₂ H ₃ O ₂) ₂ ·4H ₂ O	245 038	M.		1 589	
1313	MnCl ₂ ·2C ₂ H ₃ N·HCl	320 405		175		
1314	MnSi	82 9900		1280	5 90 ¹⁵	
1315	MnSi ₂	111 050			5 24 ¹⁵	
1316	Mn ₂ Si	137 920		1316	6.20 ¹⁵	
1317	MnO·SiO ₂	130 990		1273	3.48 ²³	63
1318	MnO·SiO ₂ —Rhodonite	130 990	Tri.	1323	3 72 ²³	929
1319	2MnO·SiO ₂ —Tephroite	201 920	R.	1300	4 043 ²⁴	949
1320	3Mn ₂ O ₃ ·MnO·SiO ₂ —Braunite	604 570	Tet.		4 78	
1321	8MnO·7SiO ₂ ·5H ₂ O—Bementite	1077 94	R.		2 90	803
1322	12MnO·8SiO ₂ ·7H ₂ O—Ectropite	1457 75	M. ?		2 46	1044
1323	MnSiF ₆ ·6H ₂ O	305 082	Trig.	d.	1 904 ¹⁷	206
1324	5MnO·SiO ₂ ·As ₂ O ₃ ·H ₂ O—Dixenite	630 645	H.		4 2	385
1324	12MnO·9SiO ₂ ·As ₂ O ₃ ·7H ₂ O—Schallerite	1747 73			3 368	344
1325	MnO·TiO—Pyrophanite	150 830	Trig.	1404	4 54	405
1326	2MnO·6PbO·3As ₂ O ₃ ·H ₂ O—Trigonite	2188 84	M.		8 28	1004
1327	2Mn ₂ O ₃ ·3PbO·3SiO ₂ —Kentrolite	1165 44	R.		6 19	1014
1328	2Mn ₂ O ₃ ·3CrO—Crednerite	554 430			5 0	
1329	MnPtCl ₆ ·6H ₂ O	571 000	Trig.	d.	2 692	
1330	MnPtCl ₆ ·12H ₂ O	679 093	Trig.		2 112	
1331	MnPtBr ₆ ·12H ₂ O	945 841	Trig.		2 759	
1332	MnPtI ₆ ·9H ₂ O	1173 80	Trig.	d	3 604	
1333	FeO	71 8400		1420		
1334	Fe ₂ O ₃ —Hematite	159 680	Trig.	1560 d	5.12	424
1335	Fe ₂ O ₃ ·H ₂ O—Goethite	177 695	R.		4 28	1026
1336	Fe ₂ O ₃ ·H ₂ O—Lepidocrocite	177 695	R.		4 09	1013
1337	Fe ₂ O ₃ —Magnetite	231 520	C.	1538 d	5 2	
1338	FeF ₃	93 8400			4 09	
1339	FeF ₂	112 840			3 18	
1340	FeCl ₂ —Lawrensite	126 756	H.		2 7	280
1341	FeCl ₂ ·4H ₂ O	198 818			1 93	
1342	FeCl ₂ —Molysite	162 214	H.	282	2 8	
1343	2FeCl ₃ ·2HCl·4H ₂ O	469 421		45 7		
1344	FeBr ₂	215 672			4 636 ²⁸	
1345	FeBr ₃ ·6H ₂ O	403 680		27		
1346	FeI ₂	309 704		177		
1347	FeI ₃ ·4H ₂ O	381 764			2 87	
1348	FeS—Troilite	87 9050	H.	1190	4 8	
1349	FeS ₂ —Marsite	119 970	R.	Tr 450	4 87	
1350	FeS ₂ —Pyrite	119 970	C.		5 0	
1351	Fe ₂ S ₃	207 875			4 3	
1352	Fe ₃ S ₄	295 780			4 55	
1353	Fe ₂ S ₃ —Pyrrhotite	647 400	H.	d. >700	4 6	
1354	FeSO ₄ ·H ₂ O—Szomolnokite	169 920	M.		3 08	
1355	FeSO ₄ ·5H ₂ O—Siderite	241 982	Tri.		2 2	642
1356	FeSO ₄ ·7H ₂ O—Melanterite	278 012	M.		1 89	471
1357	Fe ₂ O ₃ ·2SO ₃ ·7H ₂ O—Amantite	445 918	Tri.		2.11	762
1358	Fe ₂ O ₃ ·2SO ₃ ·10H ₂ O—Fibroferrite	499 964	R.		1 86	255
1359	Fe ₂ O ₃ ·3SO ₃ ·9H ₂ O—Coquimbite	562 014	Trig.		2 1	270
1360	Fe ₂ O ₃ ·4SO ₃ ·9H ₂ O—Rhomboclase	642 079	R.			675
1361	FeO·Fe ₂ O ₃ ·4SO ₃ ·24H ₂ O—Bilinite	984 150			1 87	530
1362	2Fe ₂ O ₃ ·SO ₃ ·6H ₂ O—Glockerite	507 517				958
1363	2Fe ₂ O ₃ ·5SO ₃ ·18H ₂ O—Copiapite	1043 96	R.		2 1	654
1364	3Fe ₂ O ₃ ·4SO ₃ ·10H ₂ O—Carpnosiderite	979 454	Trig.		2 6	371
1365	Fe ₂ O ₃ ·3TeO ₃ ·4H ₂ O—Durdentite	662 242	R.			990
1366	Fe ₂ N ₃	125 688		d.	6 35	
1367	Fe(NO ₃) ₃ ·6H ₂ O	349 956		35		
1368	(NH ₄) ₂ SO ₄ ·FeSO ₄ ·6H ₂ O	392 140	M.		1 864	513
1369	(NH ₄) ₂ SO ₄ ·Fe ₂ (SO ₄) ₃ ·24H ₂ O	964 387	C.		1 71	102
1370	(NH ₄) ₂ ·SeO ₄ ·FeSeO ₄ ·6H ₂ O	486 410	M.		2 160	612
1371	FeP	86 8640			5 2	

Ag	Al	As	Au	B	Ba	Be	Bi	Br	C	Ca	Cd	Ce	Cl	Co	Cr	Cu	Dy	Er	Ea	F	Fe	Ga	Gd	Ge	Gr	H	Hf	Hg	Ho	I	In	Ir	K	La	Li	Lu		
57	55	13	33	54	79	75	15	5	16	77	51	29	59	4	44	46	85	31	67	69	64	3	43	25	65	20	75	2	73	30	68	6	26	26	83	58	81	72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_{10}^{20}	Ref. ind. finding No.
1372	Fe ₃ P ₂	142.704		1290	5.7	
1373	Fe ₃ P ₂	204.752			4.5	
1374	Fe ₃ P ₂	198.544		1110	6.74	
1375	Fe ₃ P ₂	291.616			5.04	
1376	Fe(PO ₃) ₂	292.912			3.02	
1377	Fe ₂ O ₃ ·P ₂ O ₅ ·4H ₂ O—Strengite	373.790	R.		2.87	917
1378	3FeO·P ₂ O ₅ ·8H ₂ O—Vivianite	501.661	M.		2.58	757
1379	2Fe ₂ O ₃ ·P ₂ O ₅ ·12H ₂ O—Caoxeneite	677.593	H.		3.38	285
1380	3Fe ₂ O ₃ ·2P ₂ O ₅ ·8H ₂ O—Beraunite	907.259	M.		2.9	950
1381	7FeO·2P ₂ O ₅ ·9H ₂ O—Ludlamite	949.115	M.		3.72	873
1382	2Fe ₂ O ₃ ·P ₂ O ₅ ·2SO ₃ ·2H ₂ O—Destinezite	657.569	Tr.		2.1	794
1383	2Fe ₂ O ₃ ·P ₂ O ₅ ·2SO ₃ ·2H ₂ O—Diadochite	657.569			2.0	142
1384	FeAs ₂	130.800		1020	7.83	
1385	FeAs ₂ —Arsenoferrite	205.760	C.	990	7.4	
1386	FeAs ₂ —Löllingite	205.760	R.		7	
1387	FeAsO ₄ ·4H ₂ O—Scorodite	266.862	R.		3.2	941
1388	3FeO·As ₂ O ₃ ·8H ₂ O—Symplectite	589.563	M.		2.96	857
1389	3Fe ₂ O ₃ ·2As ₂ O ₃ ·13H ₂ O—Pharmacosiderite	1109.08	M., C.		3	874
1390	FeS ₂ ·FeAs ₂ —Arsenopyrite	325.730	R.		6.2	
1391	2FeO·Sb ₂ O ₃ —Triphuyite	467.220			5.82	1015
1392	FeS·Sb ₂ S ₃ —Berthierite	427.640	R.		4.0	
1393	Fe ₃ C ₂	179.520		1837	7.4	
1394	FeCO ₃ ·H ₂ O—Siderite	133.855	Trig.		3.8	377
1395	FeC ₃ O ₄ ·2H ₂ O	179.871	R.	d. 160	2.28	
1396	Fe(CO) ₄	167.840		d. 140	1.996 ¹⁸	
1397	Fe(CO) ₅	195.840		— 21	1.157	
1398	Fe ₂ (CO) ₉	363.680		d. 100	2.085 ¹⁸	
1399	FeC ₁₀ H ₁₄ O ₈ S ₂ ·6H ₂ O—Naphthalene-β-sulfonate	578.170				1039
1400	(NH ₄) ₂ Fe(CN) ₆ ·2NH ₄ Cl·3H ₂ O	445.083	Trig.		1.490	301
1401	Fe ₄ (NO) ₇ S ₂ N(C ₂ H ₅) ₄	659.773			1.883 ¹⁹	
1402	FeSi	83.9000			6.1	
1403	FeSi ₂	111.960			5.4	
1404	Fe ₂ Si	139.740			7.0	
1405	Fe ₃ Si ₂	223.640			6.7	
1406	FeO·SiO ₂ —Gruenerite	131.900	M.	1530	3.5	890
1407	2FeO·SiO ₂ —Fayalite	203.740	R.	1255		978
1408	2Fe ₂ O ₃ ·2SiO ₂ ·3H ₂ O—Iddingsite	493.526	R.		2.8	928
1409	FeSiF ₆ ·6H ₂ O	305.992	Trig.			207
1410	Fe ₂ TiO ₄ —Ilmenite	151.740	Trig.		4.76	
1411	Fe ₃ O ₄ ·3TiO ₂ —Arizonite	399.380	M., "		4.25	1069
1412	2Fe ₂ O ₃ ·3TiO ₂ —Pseudobrookite	559.060	R.		4.7	1061
1413	6FeO·Sb ₂ O ₃ ·5TiO ₂ —Derbylite	1122.08	R.		1.53	420
1414	2Fe ₂ O ₃ ·PbO·38O ₃ ·4H ₂ O—Vegasite	854.817	H.			555
1415	3Fe ₂ O ₃ ·PbO·48O ₃ ·6H ₂ O—Plumbojarosite	1130.59	Trig.		3.63	378
1416	3Fe ₂ O ₃ ·2PbO·P ₂ O ₅ ·28O ₃ ·6H ₂ O—Corkite	1335.71	Trig.		4.2	383
1417	5Fe ₂ O ₃ ·3PbO·6As ₂ O ₃ —Carminite	2847.52			4.1	
1418	FeS·38Sb ₂ S ₃ ·4PbS—Jamesonite	1967.98	M.		5.7	
1419	3Fe ₂ O ₃ ·2PbO·As ₂ O ₃ ·28O ₃ ·6H ₂ O—Budanite	1423.58	Trig.		4.1	386
1420	9Fe ₂ O ₃ ·4PbO·6As ₂ O ₃ ·48O ₃ ·33H ₂ O—Lossenite	4622.21	R.			952
1421	2Fe ₂ O ₃ ·3PbO·3SiO ₂ —Melanotekite	1169.14	R.		5.73	1010
1422	TiFe(SO ₄) ₂ ·12H ₂ O	668.555	C.		2.38	124
1423	Zn(FeO ₂) ₂	241.060			5.33	
1424	Fe ₃ O ₄ ·CuO	239.250		1458		
1425	FeS·CuS—Chalcopyrite	183.540	Tet.		4.2	
1426	FeS·2Cu ₂ S·CuS—Bornite	501.950	C.		5.0	
1427	2FeS·CuS—Cubanite	271.415	R.		4.0	
1428	4FeS·Cu ₂ S·2CuS	702.095			5.0	
1429	4FeS·3Cu ₂ S·3CuS	1116.14			4.85	
1430	3Fe ₂ O ₃ ·CuO·2P ₂ O ₅ ·8H ₂ O—Chalcosiderite	980.829	Tri.		3.1	969
1431	Fe ₂ O ₃ ·2CuO·As ₂ O ₃ ·2H ₂ O—Chenevixite	584.771			3.93	379

Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O	Os	P	Pb	Pd	Pr	Pt	Ra	Rb	Rh	Ru	S	Sa	Sb	Se	Si	Sn	Sr	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W	Y	Zn	Zr		
76	42	47	11	82	51	61	45	1	35	12	23	41	60	37	80	84	40	39	8	63	14	56	9	18	22	75	53	66	10	24	19	27	70	49	50	48	57	71	25	31

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1432	FeS, Cu ₂ S, SnS ₂ —Stannite	429 940	Tet.		4.4	
1433	Fe ₂ O ₃ , CuO, PbO, 2SO ₃ , 4H ₂ O—Beaverite	694 642	H.		4.36	373
1434	2Ag ₂ Fe(CN) ₆ ·3NH ₃	1122 15			2.45	
1435	FePtCl ₆ ·6H ₂ O	571 910			2.7	
1436	FePtCl ₆ ·9H ₂ O	1174 80			3.45	
1437	FeO, MnO ₂ —Bixbyite	158 770	C.		4.95	
1438	Fe ₂ O ₃ , MnO—Jacobinite	230 610	C.		4.75	
1439	Fe ₂ O ₃ , 9MnO, 4P ₂ O ₅ , 14H ₂ O—Salmonsite	1618 46	R.		2.88	848
1439 1	9(MnFeO) ₂ ·8SiO ₂ ·MnCl ₂ ·7H ₂ O—Friedelite		Trig.		3 1	329
1440	CoO	74 9700	C.	d. 800	5 6s	
1441	Co ₂ O ₃	165 940			5 1s	
1442	Co ₃ O ₄	240 970		d.	6 073	
1443	Co(III) ₂	92 9854			3 597 ¹⁵	
1444	CoF ₂	96 9700	M.		4 43	
1445	CoF ₂ ·3H ₂ O	151 016			2 583 ²⁴ ₁₁	
1446	CoF ₂ ·5H ₂ O·6H ₂ O	305 101	Trig.		2 045	
1447	CoCl ₂	129 886			3 356	
1448	CoCl ₂ ·2H ₂ O	165 917			2 477 ²⁴ ₁₁	
1449	CoCl ₂ ·6H ₂ O	237 978	M.	86	1 924 ²⁴ ₁₁	
1450	Co(ClO ₄) ₂ ·6H ₂ O	333 978		61	1.92	
1451	Co(ClO ₄) ₂ ·6H ₂ O	365 978	H.	143		131
1452	Co(ClO ₄) ₂ ·7H ₂ O	383 994			2 075	
1453	CoBr ₂	218 802			4.909 ¹⁵	
1454	CoBr ₂ ·6H ₂ O	326 894		100 d.		
1455	CoI ₂	312 834			5 68	
1456	Co(IO ₃) ₂ ·6H ₂ O	510 926			3.689 ²¹	
1457	CoS—Sycpoorite	91 0350		>1100	5 45	
1458	Co ₂ S ₃ —Linnacite	305 170	C.		4.0	
1459	CoSO ₄	155 035			3 710 ²⁴ ₁₁	
1460	CoSO ₄ ·H ₂ O	173 050		d.	1 92	
1461	CoSO ₄ ·4H ₂ O	227 096			2 368 ²⁴ ₁₁	
1462	CoSO ₄ ·6H ₂ O	263 127	M.		2 020 ²⁴ ₁₁	
1463	CoSO ₄ ·7H ₂ O—Bieberite	281 143	M. ?		1.948 ²⁴ ₁₁	481
1464	CoSe	138 170			7 65	
1465	CoSeO ₄ ·5H ₂ O	292 247	Trn.	d.	2 512	
1466	CoSeO ₄ ·6H ₂ O	310 262	M.		2 32	509
1467	CoSeO ₄ ·7H ₂ O	328 278	M.		2.135	
1468	Co(NO ₃) ₂ ·3H ₂ O	237 032		91		
1469	Co(NO ₃) ₂ ·6H ₂ O	291 078	M.	<100	1 883 ²⁴ ₁₁	
1470	Co(NO ₃) ₂ ·3NH ₃	248 087			2 001 ¹⁷ ₂	
1471	[Co(NH ₃) ₄ (NO ₂) ₂]NO ₃	281 118	R.		1.922 ¹⁷	
1472	Co(NO ₃) ₃ ·6NH ₃	285 173			1.473 ²⁴ ₁₁	
1473	CoF ₂ ·6NH ₃	199 157			1.744 ²⁴ ₁₁	
1474	CoCl ₂ ·NH ₃	140 917		ca. 321		
1475	CoCl ₂ ·2NH ₃ (α)	163 948		273	2 097 ²⁴ ₁₁	
1476	CoCl ₂ ·2NH ₃ (β)	163 948			2 073 ²⁴ ₁₁	
1477	CoCl ₂ ·4NH ₃	198 010		d.	1.593 ²⁴ ₁₁	
1478	CoCl ₂ ·5NH ₃	215 042			1 580 ²⁴ ₁₁	
1479	[Co(NH ₃) ₄ Cl]Cl ₂	250 500	R.		1 819 ²⁴ ₁₁	
1480	CoCl ₂ ·6NH ₃	232 073		d.	1 497 ²⁴ ₁₁	
1481	CoCl ₂ ·6NH ₃	267 531	M.		1 744 ²⁴ ₁₁	
1482	CoCl ₂ ·10NH ₃	300 197			1.71 ²⁴ ₁₁	
1483	[Co(NH ₃) ₄ (OH ₂)Cl]Cl ₂	251 484	R.		1.847	
1484	[Co(NH ₃) ₄ (NO ₂)Cl]Cl ₂	261 050	M.		1.698 ¹⁸	
1485	[Co(NH ₃) ₄ (NO ₂)](NO ₃)Cl	287 500	R.		1.800	
1486	CoBr ₂ ·2NH ₃	252 864		260		
1487	[Co(NH ₃) ₄ Br]Br ₂	383 874		d.	2.483 ¹⁷ ₂	
1488	CoBr ₂ ·6NH ₃	320 989			1.955	
1489	[Co(NH ₃) ₄ Br]Cl ₂	294 958			2 095 ¹⁸ ₂	
1490	CoI ₂ ·2NH ₃	346 896		222		
1491	(NH ₄) ₂ SO ₄ ·CoSO ₄ ·6H ₂ O	395 270	M.		1.901	521
1492	Co(SO ₄) ₂ ·4NH ₃ ·2H ₂ O	355 255			1 804 ²⁴ ₁₁	
1493	Co(SO ₄) ₂ ·5NH ₃	336 256			1.703 ²⁴ ₁₁	

Ag 23 Al 13 As 33 B 54 Ba 79 Be 15 Bi 5 C 16 Ca 51 Ce 59 Cl 44 Co 46 Cr 48 Cu 31 Dy 67 Er 69 Eu 64 Fe 34 Ga 25 Gd 65 Ge 20 Hf 73 Hg 80 Ho 68 I 53 In 20 Ir 36 K 38 La 58 Li 3 Lu 71

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1494	[Co(NH ₂) ₄ (SO ₄) ₂]SO ₄ ·H ₂ O	373 294	R.		1 828 ¹⁸	
1495	[Co(NH ₂) ₄ (OH) ₂](SO ₄) ₂ ·3H ₂ O	666 523	Tet.		1 854	
1496	[Co(NH ₂) ₄ Cl(SO ₄) ₂]·3H ₂ O	346 726	R.		1 765	
1497	(NH ₄) ₂ SeO ₄ ·CoSeO ₄ ·6H ₂ O	489 540	M.	d.	2 212	623
1498	Co(NH ₂) ₄ Cl(SO ₄) ₂ ·3H ₂ O	393 861	R.		1.937	
1499	Co(H ₂ PO ₄) ₂ ·6H ₂ O	297 141			1.800 ^{18, 19}	
1500	CoAs ₂ —Safflorite	208 890		d.	6.97 ⁰	
1501	CoAs ₂ —Smaltite	208 890		d.	6 8	
1502	CoAs ₂ —Skutterudite	283 850			6.79	
1503	Co ₂ As ₂	342 820		d.	7.35 ⁰	
1504	Co ₂ As ₂	326 830		d.	7.82 ⁰	
1505	Co ₂ (AsO ₄) ₂ ·8H ₂ O—Erythrite	598 953	M.		2 9	850
1506	CoAsS—Cobaltite	165 995	C.	d.	6.2	
1507	CoCO ₃ —Spherochalcite	118 970	Trig.		2 818 ²¹	375
1508	CoC ₂ O ₄	146 970			2.325 ¹⁹	
1509	Co(CO) ₄	170 970		51	1 73 ¹⁸	
1510	Co(CHO ₂) ₂ ·2H ₂ O	185 016			2 129 ²²	
1511	CoC ₂ H ₂ O ₄ ·2H ₂ O—Malonate	197 016			2 279	
1512	Co(C ₂ H ₃ O ₂) ₂ ·4H ₂ O	249 078	M.		1 718 ⁷	651
1513	Co(C ₂ H ₃ O ₂) ₂ —Acetylacetonate	356 132				
1514	CoC ₁₀ H ₈ O ₈ S ₂ ·6H ₂ O—1, 5-Naphthalene-disulfonate	453 239	M.		1 77	799
1515	Co(CO) ₄ NO	172 978		-1 05	1.1 513 ¹⁴	
1516	[Co(NH ₂) ₄ (C ₂ O ₄) ₂]NO ₃ ·HNO ₃	357 149			1 264 ¹⁵	
1517	CoSi	87 0300		1393	6 30	
1518	CoSi ₂	115 090		1277	5 3 ⁰	
1519	CoSi ₃	143 150		1307		
1520	Co ₂ Si	140 000		1327	7 11 ⁷	
1521	Co ₂ SiO ₄	210 000			4.63	
1522	CoSiF ₆ ·6H ₂ O	309 122	Trig.		2.087	413
1523	CoSnCl ₆ ·6H ₂ O	498 510	It. Trig.		2.600	
1524	CoPtCl ₆ ·6H ₂ O	575 040	Trig.	d.	2.690	
1525	CoPtBr ₆ ·12H ₂ O	949 881	Trig.		2.762	
1526	CoPtI ₆ ·9H ₂ O	1177.93	Trig.		3 618	
1527	CoPtI ₆ ·12H ₂ O	1231.98	Trig.		3 048	
1528	NiO—Bunsenite	74 0900	C.		7.45	201
1529	Ni ₂ O ₃	165 380			4 83	
1530	Ni ₂ O ₄ ·2H ₂ O	258 085			3 412 ²²	
1531	NiF ₂	96 6900			4.63	
1532	NiF ₂ ·3H ₂ O	150 736			2.014 ¹⁹	
1533	NiF ₂ ·5HF·6H ₂ O	304 821	Trig.		2.132	
1534	NiCl ₂	129 606			3 544	
1535	Ni(ClO ₄) ₂ ·6H ₂ O	333 698		80 d.	2 07	
1536	Ni(ClO ₄) ₂ ·6H ₂ O	365 698	II.	149		132
1537	Ni(ClO ₄) ₂ ·7H ₂ O	383 714			2 15	
1538	NiBr ₂	218 522			4 04 ¹⁸	
1539	Ni(IO ₃) ₂	408 554			5 07	
1540	Ni(IO ₃) ₂ ·4H ₂ O	480 616	II.	d. ca. 100		
1541	NiS—Millerite	90 7550	Trig.	797	4 60	
1542	Ni ₂ S	149 415			5 52	
1543	Ni ₂ S ₂	240 200		794		
				Tr. 545		
1544	Ni ₂ S ₄ —Polydymite	304 330	C.		4.7	
1545	NiSO ₄	154 755			3.68	
1546	NiSO ₄ ·H ₂ O	172 770			1.98	
1547	NiSO ₄ ·6H ₂ O	262 847	Tet. M.	Tr. 53 3	2 07	246
1548	NiSO ₄ ·7H ₂ O—Morenosite	280 863	R.		1 948	501
1549	NiSeO ₄ ·6H ₂ O	326 912	Tri.	d.	1.908	
1550	NiSe	137 890			8.46	
1551	NiSeO ₄ ·6H ₂ O	309 982	Tet.		2 31	262
1552	Ni(NO ₃) ₂ ·6H ₂ O	290 798	M.	56.7	2.05	
1553	NH ₄ Cl·NiCl ₂ ·6H ₂ O	291 195	M.		1 645	
1554	Ni(ClO ₄) ₂ ·6NH ₃	327 793		180	1.52	

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Rb Rb Ru S Se Sb Sn Te Tl Tm U V W Y Yb Zn Zr
76 43 47 11 82 51 61 45 1 35 12 23 41 60 27 80 84 40 39 8 63 14 56 9 18 22 78 62 66 10 24 71 19 27 70 49 50 48 67 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1555	Ni(BrO ₃) ₂ ·6NH ₃	416 709		exp. 195	1.99	
1556	Ni(IO ₃) ₂ ·5NH ₃	493 710			2.97	
1557	(NH ₄) ₂ Ni(SO ₄) ₂ ·6H ₂ O	394 990	M.		1.923	539
1558	(NH ₄) ₂ Ni(SeO ₄) ₂ ·6H ₂ O	489 260	M.	d.	2.22	643
1559	NiP ₂	120 738			4.62 ¹⁸	
1560	NiP ₃	151 762			4.19 ¹⁸	
1561	Ni ₂ P	148 404		1112	6.3 ¹⁵	
1562	Ni ₃ P ₂	238 118			5.99	
1563	Ni(H ₂ PO ₃) ₂ ·6H ₂ O	296 861		d.	1.824	
1564	NiAs—Nicolite	133 650	H.	968	7.57 ⁹	
1565	NiAs ₂ —Rammelsbergite	208 610	R.		7.1	
1566	Ni ₃ As ₂ —Maucherite	325.990	Tet.		7.86 ⁹	
1567	Ni ₁₂ As ₂	443 370		998 Tr. 970		
1568	Ni ₂ (AsO ₄) ₂	453 990			4.982	
1569	3NiO·As ₂ O ₃ ·8H ₂ O—Annabergite	598 113	M.		3.0	845
1570	NiAsS—Gersdorffite	165 715			6.3	
1571	NiSb—Breithauptite	180 460	H.	1158	7.70 ¹¹	
1572	Ni ₂ Sb ₃	536 990		1170		
1573	NiSbS—Ullmannite	212 525	C.		6.6	
1574	NiC ₂ O ₄	146 690			2.235	
1575	Ni(CO) ₄	170 690		-25	1.1310	
1576	3NiO·CO ₂ ·H ₂ O—Zaratite	286 085			2.6	136, 143
1577	Ni(CHO) ₂ ·2H ₂ O	184 736			2.154	
1578	Ni(C ₂ H ₃ O ₂) ₂	176 736			1.798	
1579	Ni(C ₂ H ₃ O ₂) ₂ ·4H ₂ O	248 798			1.744 ^{16, 7}	
1580	NiC ₁₀ H ₈ O ₈ S ₂ ·6H ₂ O—1, 5-Naphthalene disulfonate	452 959	M.		1.79	808
1581	Ni ₂ Si	145 440		1309	7.21 ⁷	
1582	2NiO ₂ ·3SiO ₂ ·2H ₂ O—Connarite	397 590	H.		2.5	292
1583	NiSiF ₆ ·6H ₂ O	308 842	Trig.	d.	2.134	210
1584	NiPdCl ₆ ·6H ₂ O	486 230	H.		2.353	
1585	3NiO·6CuO·2As ₂ O ₃ ·SO ₃ ·7H ₂ O—Lundakerite	1367 50	M. ?		2.25	851
1586	NiPtCl ₆ ·6H ₂ O	574 700	Trig.		2.798	
1587	NiPtBr ₆ ·6H ₂ O	841 508	Trig.		3.715	
1589	CrO ₃	100 010	R.	190 d.	2.7	
1590	Cr ₂ O ₃	152 020	H.	1900	5.21	
1591	Cr ₂ O ₃ ·3H ₂ O	310 086			2.90	
1592	Cr ₂ O ₃	404 050			4	
1593	CrF ₃	90 0100		1100	4.11	
1594	CrF ₄	109 010	R.	>1000	3.8	
1595	CrCl ₂	122 926			2.75	
1596	CrCl ₃	158 384			2.7	
1597	CrO ₂ Cl ₂	154 926		-96.5	1.1836	
1598	(CrO ₂) ₂ Cl ₂	632 798			2.5	
1599	CrS	84 0750			4.1	
1600	Cr ₂ S ₃	200 215			3.7	
1601	Cr ₂ (SO ₄) ₃	344 215			2.2	
1602	Cr ₂ (SO ₄) ₃	392 215			3.0	
1603	Cr ₂ (SO ₄) ₃ ·17H ₂ O	698 476			1.7	
1604	H ₂ CrSO ₇	198 090		190 d.		
1605	H ₂ CrSeO ₇	245 225		200		
1606	(NH ₄) ₂ CrO ₄	152 088	M.		1.8	
1607	CrO ₃ ·3NH ₃	167 103	R.		1.96	
1608	(NH ₄) ₂ Cr ₂ O ₇	252 098	M.		2.15	
1609	(NH ₄) ₂ Cr ₂ O ₁₀	352 108	R.		2.33	
1610	(NH ₄) ₂ Cr ₂ O ₁₂	452 117		170	2.34	
1611	NH ₄ IO ₆ ·CrO ₃	292 981	R.		3.5	
1612	(NH ₄) ₂ CrSO ₇	232 153		160		
1613	Cr ₂ (SO ₄) ₃ ·(NH ₄) ₂ SO ₄ ·24H ₂ O	950 727	C.	100 d.	1.72	101
1614	CrP	83 0340			5.7	
1615	Cr(PO ₃) ₃	289 082			2.97	

Ag 23 Al 13 As 33 B 54 Br 55 Bi 81 C 12 Ca 20 Cd 48 Ce 58 Cl 17 Co 27 Cr 24 Cu 29 Dy 64 Ee 64 F 9 Fe 26 Ga 31 Gd 64 Ge 32 H 1 Hf 73 Ho 67 I 53 In 81 Ir 76 K 19 La 57 Li 3 Lr 103 Mn 25 Mo 42 Nb 41 Ni 28 O 8 Os 76 Pb 82 Pt 78 Rh 45 Ru 44 S 16 Se 34 Si 14 Sn 50 Sr 38 Ta 73 Te 52 Th 90 Ti 22 U 92 V 23 W 74 Xe 54 Y 39 Zn 30 Zr 40

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_{10}°	Ref. ind. finding No.
1616	$\text{Cr}_4(\text{P}_2\text{O}_7)_3$	730 184	M.		3 2	
1617	Cr_3As_3	328 900			6 2	
1618	$4\text{CrO}_3 \cdot \text{As}_2\text{O}_3 \cdot 2(\text{NH}_4)_2\text{O} \cdot \text{H}_2\text{O}$	752 131		d 175	1 8 ₃	
1619	Cr_3C_2	180 030		1890	6 0 ₈	
1620	Cr_3C	220 040			6 7 ₅	
1621	Cr_3C_2	284 050		1665	6 9 ₂	
1622	$\text{Cr}_2\text{O}_3 \cdot \text{H}_2\text{O}$	158 025			2 46	
1623	$\text{Cr}(\text{d-C}_4\text{H}_4\text{O}_4)$	200 041			2 33 ¹³	
1624	$\text{Cr}[\text{CH}(\text{COCH}_3)_2]_2$ —Acetylacetonate	349 172		214		
1625	$[\text{Cr}(\text{CON}_2\text{H}_4)_4]\text{Cl}_3 \cdot 3\text{H}_2\text{O}$	572 711		150		
1626	$[\text{Cr}(\text{CON}_2\text{H}_4)_4](\text{CN})_3 \cdot 5.5\text{H}_2\text{O}$	589 400		75		
1627	$[\text{Cr}(\text{CON}_2\text{H}_4)_4](\text{SCN})_4$	586 510		90 d.		
1628	CrSi_2	108 130			4 4	
1629	Cr_3Si	184 090			6 5 ₂	
1630	Cr_3Si_2	212 150			5 5	
1631	PbCrO_4 —Crocoite	323 210	M.	841	6 3	1000
1632	$3\text{PbO} \cdot 2\text{CrO}_3$ —Phoenicochroite	869 620			5 7 ₅	
1633	$\text{TiCr}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	664 725	C.		2 3 ₈	122
1634	ZnCr_2O_4	233 400			5 3	
1635	$(\text{NH}_4)_2\text{Cr}_2\text{O}_7 \cdot \text{HgCl}_2$	523 624	M		3 1 ₁	
1636	Ag_3CrO_4	331 770			5 625	
1637	$\text{Ag}_3\text{Cr}_2\text{O}_7$	131 780			4 770	
1638	$\text{MnO} \cdot \text{Cr}_2\text{O}_3$	222 950			4 87	
1639	FeCr_2O_4 —Chromite	223 860	C.		4 5	181
1640	$\text{NiCr}_2\text{O}_4 \cdot \text{Cl}_2 \cdot 9\text{H}_2\text{O}$	491 765		47		
1641	MoO_2	128 000	Tet.		4 510 ^{19,3}	
1642	MoO_3	144 000	R.	795	4 50 ^{19,3}	
1643	$\text{Mo}_6\text{O}_{14} \cdot 6\text{H}_2\text{O}$	812 092			3 6 ¹⁸	
1644	H_2MoO_4	162 015	H	d 115		
1645	H_4MoO_6	180 031	M Tr ?		3 124 ¹³	
1646	MoF_6	210 000		17		
1647	MoO_2F_2	166 000			3 494	
1648	MoOF_4	188 000		98	3 001	
1649	MoCl_5	273 290		194		
1650	MoI_2	349 864			4 3	
1651	MoS_2 —Molybdenite	160 130	H	1185	4 8	
1652	Mo_2S_3	288 195			5 9 ¹⁹	
1653	$(\text{NH}_4)_2\text{MoO}_4$	190 078	M.		2 270	
1654	$18\text{MoO}_3 \cdot 14\text{NH}_3 \cdot 3\text{H}_2\text{O}_7 \cdot 18\text{H}_2\text{O}$	3256 76	M.		2 975	
1655	Mo_2P_2	254 018			6 17	
1656	$\text{Mo}(\text{PO}_3)_3$	333 072			3 28 ¹¹	
1658	$\text{MoCl}_5 \cdot \text{POCl}_3$	426 088		127		
1659	$18\text{MoO}_3 \cdot \text{As}_2\text{O}_3 \cdot 28\text{H}_2\text{O}$	3326 35	Tr.		3 088	
1660	$18\text{MoO}_3 \cdot \text{As}_2\text{O}_3 \cdot 38\text{H}_2\text{O}$	3506 51	Tr.	d.	2 822	
1661	$\text{Bi}_2\text{O}_3 \cdot \text{MoO}_3$ —Koechlinite	610 000	R.			1065
1662	MoC	108 000		2570	8 40	
1663	Mo_2C	204 000		2380	8 9	
1664	$\text{Mo}(\text{CO})_6$	264 000			1 95	
1665	$3\text{C}_2\text{H}_4(\text{NH}_2)_2 \cdot \text{HSCN} \cdot \text{Mo}(\text{OH})(\text{SCN})_2$	462 447		128 d.		
1666	MoSi_2	152 120			6 1	
1667	$\text{TiO}_2 \cdot 12\text{MoO}_3 \cdot 22\text{H}_2\text{O}$	2204 24	Tet.	60		
1668	PbMoO_4 —Wulfenite	367 200	Tet.	1068	6 7	419
1669	$2\text{PbO} \cdot \text{MoO}_3$	590 400		951		
1670	$\text{Fe}_2\text{O}_3 \cdot 3\text{MoO}_3 \cdot 7.5\text{H}_2\text{O}$ —Molybdite	774 796	R.		4 5	919, 936, 953
1671	$\text{WO}_3 \cdot \text{H}_2\text{O}$ —Tungstite	250 015	R.	1473	5 5 ?	1018
1672	WF_6	298 000		2 5		
1673	WOF_4	276 000		110		
1674	WCl_6	361 290		248		
1675	WCl_5	396 748		275		
1676	WO_2Cl_2	286 916				
1677	WOCl_4	341 832		211		
1678	WBr_6	583 580		276		

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Re Rh Ru S Se Sb Sn So Si Sm Sr Ta Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
 76 42 47 11 82 51 61 46 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 23 78 52 66 10 24 19 27 70 49 50 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_{10}°	Ref. ind. finding No.
1679	WOBr ₄	519.664		277		
1680	WCl ₄ ·3WBr ₄	2387.24		232	6.9 ¹⁰	
1681	WI ₂	437.864			5.2 ¹⁰	
1682	WI ₄	691.728			7.5 ¹⁰	
1683	WS ₂	218.130			8.5	
1684	WP	215.024			5.8	
1685	WP ₂	246.048			5.2 ¹	
1686	W ₂ P ₃	798.048			4.68	
1687	24WO ₃ ·P ₂ O ₅ ·45H ₂ O	6520.74	C.		6.9 ¹⁰	
1688	WAs ₂	333.920			15.7 ¹⁰	
1689	WC	196.000		2777	16.06 ¹⁰	
1690	W ₂ C	380.000		2877		
1691	W ₃ C	564.000		>2700		
1692	WSi ₂	240.120			9.3 ⁰	
1693	W ₂ Si ₃	452.180			10.9	
1694	PbO·WO ₃ —Raspite	455.200	M.	1123		1023
1695	PbO·WO ₃ —Stolzite	455.200	Tet.		8.23	401
1696	CuO·WO ₃ —Cuprotungstite	311.570	Tet.			1007
1697	MnO·WO ₃ —Hübnerite	302.930	M.		7.2	1017
1698	FeO·WO ₃ —Ferberite	303.845	Tet.		6.64	1062
1699	Fe ₂ O ₃ ·WO ₃ ·6H ₂ O—Ferriungstite	499.772	H.			364
1700	NiO·WO ₃	306.690	R.		6.88 ²⁰	
1701	3Cr ₂ O ₃ ·W ₂ C	920.090			8.4 ¹²	
1702	UO ₂ —Uraninite	270.170	R.		10.5	
1703	UO ₃	286.170			5.92	
1704	UO ₃ ·2H ₂ O	338.201		d. 115		
1705	U ₂ O ₅ —Pitchblende	842.510			7.31	
1706	UF ₄	352.170	M.		4.68	
1707	(UO ₂)(ClO ₄) ₂ ·4H ₂ O	541.148		110 d.		
1708	(UO ₂)(ClO ₄) ₂ ·6H ₂ O	577.178		90		
1709	UBr ₄	557.834			4.84	
1710	UI ₄	745.898		500	5.6	
1711	UO ₂ (IO ₃) ₂	620.034	R.	d. 250	5.2	
1712	UO ₂ (IO ₃) ₂ ·H ₂ O	638.049			5.05	
1713	UO ₂ SO ₄ ·3H ₂ O	420.281		d. 100	3.28	
1714	UO ₂ NO ₃ ·6H ₂ O	440.270	R.	59	2.742	
1715	UO ₂ (NO ₃) ₂ ·3H ₂ O	448.232		120		
1716	UO ₂ (NO ₃) ₂ ·6H ₂ O	502.278	R.	d. 100	2.81	525
1717	(NH ₄) ₂ (UO ₂)(NO ₃) ₂ ·2H ₂ O	590.310			2.78	
1718	(NH ₄) ₂ (UO ₂)(SO ₄) ₂ ·2H ₂ O	534.408			3.01	
1719	UO ₂ ·2P ₂ O ₅	554.266	R.		3.9	
1720	3UO ₂ ·P ₂ O ₅ ·6H ₂ O—Phosphuranylite	1060.65	C.			906
1721	3UO ₂ ·As ₂ O ₅ ·12H ₂ O—Troegerite	1304.61	M.		3.3	802
1722	Bi ₂ O ₃ ·2UO ₂ ·3H ₂ O—Uranospherite	1060.39	R.		6.36	993
1723	5Bi ₂ O ₃ ·3UO ₂ ·2As ₂ O ₅ ·12H ₂ O—Walpurgite	3816.53	Tri.		5.76	997
1724	UC ₂	262.170		2260	11.3 ¹⁵	
1725	U ₂ C ₃	512.340		2400	11.28	
1726	UO ₂ ·CO ₂ —Rutherfordine	330.170	Tet.		5.6	935
1727	UO ₂ ·C ₂ O ₄	358.170			2.98	
1728	UO ₂ (C ₂ H ₃ O ₂) ₂ ·H ₂ O	378.201		d. 110	3.69 ¹⁰	
1729	UO ₂ (C ₂ H ₃ O ₂) ₂ ·2H ₂ O	424.247	R.	d. 275	2.89 ¹⁵	
1730	(NH ₄) ₂ (UO ₂)(C ₂ O ₄) ₂ ·2H ₂ O	558.356			2.77	
1731	UO ₂ (C ₂ H ₃ O ₂) ₂ ·NH ₄ C ₂ H ₃ O ₄	465.278	Tet.			223
1732	USi ₄	294.290			8.0	
1733	12U ₂ O ₅ ·5SiO ₂ ·14H ₂ O—Soddite	6844.60	R.		4.627	
1734	U ₄ Pb ₃ O ₁₇ ·4H ₂ O—Curite	1949.31			7.19	
1735	8UO ₂ ·4PbO·3P ₂ O ₅ ·12H ₂ O—Dewindtite	3824.49			4.8	
1736	UPbSiO ₄ ·1.33H ₂ O—Kasolite	593.450	M.		5.96	
1737	Cu(UO ₂) ₂ P ₂ O ₇ ·SH ₂ O—Metatorbernite I	938.081	Tet.		3.5	303
1738	CuO·2UO ₂ ·P ₂ O ₅ ·SH ₂ O—Torbernite	938.081	Tet.		3.5	737
1739	CuO·2UO ₂ ·As ₂ O ₅ ·SH ₂ O—Zeunente	993.953	Tet.		3.2	317
1740	VO	66.9600			5.758 ¹⁴	
1741	VO ₂	82.9600		>1755	4.399	

Ag 25

Al 55

As 15

Au 33

B 54

Ba 79

Be 15

Br 5

C 10

Ca 20

Cl 17

Co 59

Cr 44

Cu 63

Fe 56

Ni 58

Dy 90

Er 64

Eu 34

F 43

Ga 69

Ge 72

H 1

I 53

Hf 73

Hg 80

Ho 67

I 26

Ir 20

K 39

La 57

Li 69

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1742	V ₂ O ₅	133 920			3 64	
1743	V ₂ O ₅	149 920		1070	4 87 ^{1,8}	
1744	V ₂ O ₅	181 920		800	3 357	
1745	VF ₃	107 960	R.		3 363 ¹⁹	
1746	VF ₃	126 960		d. 325	2 075 ²²	
1747	VF ₃	145 960			2 177 ¹⁹	
1748	VOF ₂	104 960		d.	3 390 ¹⁹	
1749	VOF ₂	123 960		300	2 459	
1750	VCl ₃	121 876	H.		3 23 ¹⁸	
1751	VCl ₃	157 334			3 00 ¹⁸	
1752	VCl ₃	192 792		-109	1. 1 810 ²⁰	
1753	VOCl ₂	102 418			2 824	
1754	VOCl ₂	137 876			2 88 ¹²	
1755	VOCl ₂	173 334		< -15	1. 1 829	
1756	V ₂ O ₅ Cl	201 378			3 64	
1757	VOBr ₂	146 876		d. 480	4 00 ¹⁸	
1758	VOBr ₂	306 708			2 933 ^{14,5}	
1759	V ₂ S ₅	166 050			4 200	
1760	V ₂ S ₅	198 115			4 7 ²¹	
1761	V ₂ S ₅	262 245			3 000	
1762	V ₂ O ₅ ·3SO ₃ ·16H ₂ O—Minasragrite	694 361	M. Tr.			619
1763	VN	64 9680		2050	5 630	
1764	(NH ₄) ₂ VS ₄	233 336			1 620	
1765	(NH ₄) ₂ V ₂ S ₈ O ₄	382 465			1 716	
1766	Bi ₂ O ₃ ·V ₂ O ₅ —Pucherite	647 920	R.		6 25 ^{24,5}	1064
1767	VC	62 9600		2830	5 4	
1768	V ₂ C ₃	239 840		2750 ^{mm}		
1769	(NH ₄) ₂ VO(CNS) ₄ ·5H ₂ O	425 407	R.	58		
1770	VS ₂	107 080			4 42	
1771	V ₂ Si	129 080			5 48 ¹⁷	
1772	PbO·V ₂ O ₅	405 120		849		
1773	2PbO·V ₂ O ₅	628 320		722		
1774	3PbO·V ₂ O ₅	851 520		952		
1775	8PbO·V ₂ O ₅	1907 52		794		
1776	9PbO·3V ₂ O ₅ ·PbCl ₂ —Vanadinite	2832 68	H.		6 863	403
1777	TiVO ₃	303 360		424		
1778	Ti ₂ VO ₄	728 160		566		
1779	Ti ₂ V ₂ O ₇	315 200		454		
1780	Ti ₂ V ₂ O ₁₁	1638 24			8 50 ^{17,5}	
1781	4(PbZn)O·V ₂ O ₅ ·H ₂ O—Descloizite		R.		6 0	1021
1782	Cd ₁₀ V ₆ Cl ₂ O ₁₄	1884 78	H.		5 204 ¹⁵	
1783	Cd ₁₀ V ₆ Br ₂ O ₁₄	1973 69	H.		5 450 ¹⁵	
1784	2PbO·2CuO·V ₂ O ₅ ·H ₂ O—Cuprodescloizite	805 475	R.		6 1	1020
1785	Ag ₄ V ₂ O ₇	645 440		383		
1786	5(NH ₄) ₂ O·P ₂ O ₅ ·3V ₂ O ₅ ·15MoO ₃ ·39H ₂ O	3810 80			2 410	
1787	6(NH ₄) ₂ O·P ₂ O ₅ ·6V ₂ O ₅ ·12MoO ₃ ·41H ₂ O	4012 67			2 411	
1788	3(NH ₄) ₂ O·SiO ₂ ·V ₂ O ₅ ·9MoO ₃ ·20H ₂ O	2054 52			2 802 ¹⁸	
1789	3(NH ₄) ₂ O·SiO ₂ ·V ₂ O ₅ ·10MoO ₃ ·21H ₂ O	2216 54			2 804 ¹⁸	
1790	3(NH ₄) ₂ O·SiO ₂ ·V ₂ O ₅ ·11MoO ₃ ·27H ₂ O	2468 63	M. ?		2 807	
1791	3(NH ₄) ₂ O·SiO ₂ ·V ₂ O ₅ ·15MoO ₃ ·24H ₂ O	2990 58			2 816	
1792	3(NH ₄) ₂ O·SiO ₂ ·V ₂ O ₅ ·9WO ₃ ·24H ₂ O	2918 58			3 40	
1793	3(NH ₄) ₂ O·SiO ₂ ·V ₂ O ₅ ·10WO ₃ ·21H ₂ O	3096 53			3 43	
1794	2UO ₃ ·3V ₂ O ₅ ·15H ₂ O—Uvanite	1388 33	R.			979
1795	Cb ₂ O ₄	266 200		1520	4 60 ^{61,2}	
1796	CbF ₃	188 100		75 5	3 29	
1797	CbCl ₃	270 390		104	2 75	
1798	CbOCl ₂	215 474				
1799	CbC	105 100				
1800	Cb ₂ FeO ₆ —Ferroniobite	338 040	R.		6 26	1063
1801	Ta ₂ O ₅	443 000	R.	1470 d.	8 73 ^{61,2}	
1802	TaF ₅	276 500		96 8	4 74	
1803	TaCl ₅	358 790		221	3 68 ²⁷	
1804	TaBr ₅	581 080		240		

Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O	Os	P	Pb	Pd	Pr	Pt	Ra	Rb	Rh	Ru	S	Sa	Sb	Se	Sm	Sn	Sr	Ta	Tb	Tc	Th	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr	
76	43	47	11	82	61	61	45	1	35	12	23	41	60	37	80	84	40	39	8	63	14	66	9	18	22	78	62	66	10	24	19	27	70	49	50	48	57	71	28	21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1805	TaC	193 500	R.		8.83°	1019
1806	TaSi ₂	237 620			7.03	
1807	Ta ₂ O ₅ ·MnO - Manganotantalate	513 930			1. 1.85 glass	
1808	B ₂ O ₃	69 6400			1.49	
1809	B ₂ O ₃ ·3H ₂ O - Sassolite	123 686		Tri.	d.	
1810	B ₃ H ₆	27 6862		-169		
1811	B ₄ H ₁₀	53 3570		-112		
1812	B ₁₀ H ₁₂	122 308		99.5	0.94	
1813	BF ₃	67 8200		-127		
1814	BCl ₃	117 194		-107	1. 1.434 ₄	
1815	BBr ₃	250 568	Tri.	-45	1. 2.60	11
1816	B ₂ H ₄ Br	102 564		-104		
1817	BI ₃	391 616		43	1. 3.3 ₅₀	
1818	B ₂ S ₃	117 835		310	1.55	
1819	BN ₂	38 8360				
1820	NH ₄ BF ₄	104 859			1.851 ₁₇	
1821	CB ₄	76 9200		2350	2.6	
1822	B(C ₂ H ₅) ₃	55.8893		56		
1823	B(C ₂ H ₅) ₃	97.9355			1. 0.696 ₃₃	
1824	B(OC ₂ H ₅) ₃	103 889			1. 0.915	
1825	B(OC ₂ H ₅) ₃	115 936	Tri.		1. 0.864 ₂₆ b	14
1826	B(OC ₃ H ₇) ₃	187 982			1. 0.867 ₁₆	
1827	B(OC ₄ H ₉) ₃ - Isobutyl	230 028			1. 0.864 ₉	
1828	B(OC ₅ H ₁₁) ₃ - Isoamyl	272 074			1. 0.872 ₂₀	
1829	SiB ₄	60 5200			2.52	
1830	SiB ₆	92 9800			2.47	
1831	Zr ₃ B ₄	316 280			3.7	
1833	ThB ₄	275 430			7.5	
1834	ThB ₆	297 070			6.4	
1835	TiBO ₂	247 220	Tri.	472		923
1836	Ti ₃ BO ₄	672 020		370 d.		
1837	Ti ₄ B ₂ O ₇	919 240		434		
1838	B ₂ O ₃ ·CuO	198 050		875		
1839	B ₂ O ₃ ·CuO	119 210		d. 875	3.86	
1840	MnB ₂	76 5700			6.9	
1841	Mn ₃ B ₄ O ₉	352 070			3.61	
1842	FeB	66 6600			7.15	
1843	Fe ₂ B	122 500			7.4	
1844	FeB ₂	77 4800			5.0	
1845	Fe ₂ B ₃	165 780	Tri.	1310		359
1846	Fe ₃ B ₄	300 840		1351		
1847	CoB	69 7900			7.25	
1848	Co ₂ B	112 740			7.9	
1849	NiB	69.5100			7.4	
1850	Ni ₂ B ₃	128 200		1225	8.0	
1851	Ni ₃ B ₄	197 710		1160		
1852	CrB	62 8300			5.5	
1853	Cr ₂ B ₃	177 670			6.7 ₁₅	
1854	Mo ₃ B ₄	331 280	M.		7	602
1855	WB ₂	205 640			10.8	
1857	B ₂ O ₃ ·9WO ₃ ·2NiO·18H ₂ O	2631 30		80	1. 3.6 ₈₀	
1858	Al ₂ O ₃ - Corundum	101 920		2050	4.00	
1859	Al ₂ O ₃ ·H ₂ O - Diaspore	119 935		d. 360	3.413	
1860	Al ₃ O ₃ ·3H ₂ O - Gibbsite	155 966		d. 200	2.423	
1861	Al(OH) ₃	77 9831				
1862	AlF ₃	83.9600		1040	3.07	
1863	AlF ₃ ·H ₂ O - Fluellite	101 975			2.17	
1864	AlCl ₃	133 334		194	2.44 ₄ ²⁴	
1865	AlBr ₃	266 708	Trig.	97.5	1. 1.31 ₄ ²⁰	507
1866	AlBr ₃ ·15H ₂ O	536 939		- 7.5 m	3.01 ₄ ²⁴	
1867	Al(BrO ₂) ₃ ·9H ₂ O	572 847		62.3	1. 2.64 ₄ ²⁰	

Ag 87 Al 13 Au 193 B 108 Ba 137 Bi 208 Br 79 C 12 Ca 40 Cd 112 Ce 140 Cl 35 Co 59 Cr 52 Cu 64 Dy 163 Eu 152 F 19 Ga 70 Ge 72 H 1 Hf 178 Hg 200 I 127 In 75 Ir 223 K 39 La 138 Li 7 Lu 174

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1868	AlBrCl ₂	177.792		143		
1869	AlI ₃	407.758		191	3.98	
1870	Al ₂ S ₃	150.115	H.	110°	1.3 20 ₄ ²⁰	
1871	Al ₂ O ₃ ·SO ₃ ·9H ₂ O—Aluminite	344.124	M.	d.	2.02	453
1872	Al ₂ O ₃ ·2SO ₃ —Alumian	262.050	Trig.		1.705°	286
1873	Al ₂ O ₃ ·3SO ₃	342.115		d. 77°	2.74	
1874	Al ₂ O ₃ ·3SO ₃ ·18H ₂ O—Alunogenite	630.361	M.		2.71	468
1875	2Al ₂ O ₃ ·SO ₃ ·10H ₂ O—Felsobanyite	461.059	R.		1.69 ₁ ¹⁷	587
1876	2Al ₂ O ₃ ·SO ₃ ·15H ₂ O—Paraluminite	554.136			2.33	462
1877	AlN	40.9680	R.	215°		
1878	Al(NO ₃) ₃ ·9H ₂ O	375.123	R.	73		
1879	AlCl ₃ ·NH ₄ Cl	186.831		304		
1880	AlCl ₃ ·3NH ₃	184.427		280 d.		
1881	Al ₂ (SO ₄) ₃ ·(NH ₄) ₂ SO ₄	474.258			2.039	
1882	Al ₂ O ₃ ·(NH ₄) ₂ O·48O ₂ ·24H ₂ O Tschermigite	906.628	C.	9.5	1.64	81
1883	AlPO ₄	121.984	H.		2.59	
1884	Al ₂ O ₃ ·P ₂ O ₅ ·4H ₂ O—Metavariscite	316.030	R.	>150°	2.51	680
1885	Al ₂ O ₃ ·P ₂ O ₅ ·6H ₂ O—Lucinite	352.060	R.		2.566	724
1886	Al ₂ O ₃ ·P ₂ O ₅ ·6H ₂ O—Zepharovichite	352.060		>150°	2.37	604
1887	Al ₂ O ₃ ·3P ₂ O ₅	528.064			2.779	
1888	2Al ₂ O ₃ ·P ₂ O ₅ ·3H ₂ O—Angelite	399.934	M.	d.	2.77	712
1889	5Al ₂ O ₃ ·2P ₂ O ₅ ·9H ₂ O—Spherite	955.835	R.	d.	2.536	711
1890	Al(AsCl ₄) ₃	358.214			2.85 ₄ ²⁴	
1891	Al ₄ C ₃	113.840			2.36	
1892	Al ₂ O ₃ ·C ₁₂ O ₆ ·18H ₂ O—Mellite	714.197	Tet.		1.64	260
1893	Al(CH ₃) ₃	72.0293				19
1894	Al(C ₂ H ₅) ₃	114.076				29
1895	Al(C ₂ H ₅ O ₂) ₃ —Acetylacetate	324.122		194		
1896	Al(OC ₂ H ₅) ₃	306.076		ca. 265	1.23	
1897	NH ₄ (CH ₃) ₂ Al(SO ₄) ₂ ·12H ₂ O	467.329	C.		1.508	75
1898	Al ₂ O ₃ ·SiO ₂ —Andalusite	161.980	R.	d.	3.2	815
1899	Al ₂ O ₃ ·SiO ₂ —Cyanite	161.980	Tri.	d.	3.6	907
1900	Al ₂ O ₃ ·SiO ₂ —Sillimanite	161.980	R.	d. <155°	3.23	819
1901	Al ₂ O ₃ ·2SiO ₂ ·2H ₂ O—Kaolinite	258.071	M.		2.6	690
1902	Al ₂ O ₃ ·2SiO ₂ ·4H ₂ O—Newtonite	294.102	Tet.		2.37	274
1903	Al ₂ O ₃ ·4SiO ₂ ·H ₂ O—Pyrophyllite	360.175	R.		2.83	727
1904	3Al ₂ O ₃ ·2SiO ₂ —Mullite	425.880	R.	181° d.	3.156	
1905	2(AlF) ₂ O·SiO ₂ —Topaz		R.		3.58	784
1906	Al ₂ Ti ₂	176.680	Tet.		3.348	
1907	3Al ₂ O ₃ ·2PbO·2P ₂ O ₅ ·7H ₂ O—Plumbogummite	1162.36	H.	d.	4.014	325
1908	3Al ₂ O ₃ ·2PbO·2SO ₃ ·P ₂ O ₅ ·6H ₂ O—Hinsdalite	1162.43	H.		3.65	865
1909	2Al(OH) ₃ ·Pb(HCO ₃) ₂ —Dundasite	485.182			3.25	
1910	Al ₂ (SO ₄) ₃ ·Ti ₂ SO ₄ ·24H ₂ O	1279.35	C.	91	2.320	107
1911	Al ₂ O ₃ ·ZnO—Automolite (Gahnite)	183.300	C.		4.58	161
1912	3Al ₂ O ₃ ·6ZnO·2SO ₃ ·18H ₂ O—Zincaluminite	1278.45	H.	d.	2.26	256
1913	Al ₂ O ₃ ·4CuO·SO ₃ ·8H ₂ O—Cyanotrichite	614.388	R.		2.737	779
1914	(AlCl) ₂ O·6CuO·SO ₃ ·9H ₂ O—Spangolite		Trig.	d.	3.14	340
1915	3M ₂ O ₃ ·CuO·2P ₂ O ₅ ·9H ₂ O—Turquoise	831.565	Tri.	d. 300	2.67	782
1916	4Al ₂ O ₃ ·18CuO·5As ₂ O ₅ ·55H ₂ O—Liroconite	3980.39	M.	d.	2.96	830
1917	Al ₂ O ₃ ·MnO	172.850	C.		4.12	
1918	Al ₂ O ₃ ·MnO·4SO ₃ ·24H ₂ O—Apjohnite	925.180	M.		1.782	477
1919	Al ₂ O ₃ ·2MnO·P ₂ O ₅ ·4H ₂ O—Eosphorite	457.890	R.		3.13	837
1920	Al ₂ O ₃ ·MnO·2SiO ₂ ·2H ₂ O—Carpholite	329.001	R.		2.94	801
1921	Al ₂ O ₃ ·3MnO·3SiO ₂ —Spessartite	194.890	C.		4.180	167
1922	Al ₂ O ₃ ·7MnO·8SiO ₂ ·6H ₂ O—Ganophyllite	1187.00	M.		2.84	914
1923	Al ₂ O ₃ ·FeO—Hereynite	173.760	C.		3.93	165
1924	Al ₂ O ₃ ·FeO·4SO ₃ ·24H ₂ O—Halotrichite	926.390	M.		2.04	505
1925	Al ₂ O ₃ ·FeO·P ₂ O ₅ ·11H ₂ O—Paravauxite	513.977	Tri.	d.	2.3	681
1926	Al ₂ O ₃ ·2FeO·P ₂ O ₅ ·4H ₂ O—Childrenite	459.710	R.	d.	3.23	876

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Rb Rh Ru S Sb Se Si Sn Sr Ta Te Th Ti Tl Tm U V W Y Yb Zn Zr
76 43 47 11 82 51 61 46 1 35 12 23 41 60 27 80 84 40 39 8 63 14 36 9 18 22 73 52 66 10 24 19 27 70 49 50 45 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1927	$2\text{Al}_2\text{O}_3 \cdot 4\text{FeO} \cdot 3\text{P}_2\text{O}_5 \cdot 24\text{H}_2\text{O}$ —Vauxite	1349.71	Tri.		2.45	677
1928	$\text{Al}_2\text{O}_3 \cdot 3\text{FeO} \cdot 3\text{SiO}_2$ —Almandite	497.620	C.		4.04	166
1929	$\text{Al}_2\text{O}_3 \cdot 3\text{FeO} \cdot 2\text{SiO}_2 \cdot 3\text{H}_2\text{O}$ —Daphnite	491.606	M.			826
1930	$5\text{Al}_2\text{O}_3 \cdot 2\text{FeO} \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Staurolite	910.528	R.		3.7	930
1931	$\text{Al}_2\text{O}_3 \cdot \text{CoO}$	176.890	C.		4.37 ¹⁸	
1932	$3\text{Al}_2\text{O}_3 \cdot 4\text{CoO}$	605.640			4.80	
1933	AlB_{12}	156.800	M.		2.5	
1934	$\text{Al}_2\text{O}_3 \cdot \text{B}_2\text{O}_3$ —Jeremejevite	171.560	H.		3.3	313
1935	$\text{BO}_2(\text{AlO})_3$	187.700	R.			758
1936	$\text{C}_2\text{B}_{12}\text{AlB}_{12}$	624.240	Tet.		2.615	
1937	$8\text{Al}_2\text{O}_3 \cdot \text{B}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Dumortierite	1263.38	R.		3.3	886
1938	Se_2O_3	138.200			3.864	
1939	SeCl_4	151.474		939		
1940	SeBr_4	284.848			3.91	
1941	$\text{Se}_2(\text{SO}_4)_3$	378.395			2.379	
1942	$\text{Se}(\text{NO}_3)_4$	231.124		150		
1943	$\text{Se}(\text{NO}_3)_4 \cdot 4\text{H}_2\text{O}$	303.186		d. 100		
1944	$\text{Se}_2\text{O}_3 \cdot 2\text{SiO}_2$ —Thortveitite	258.320	R.		3.57	946
1945	Yt_2O_3	226.000		2410	4.84	
1946	YtCl_3	195.374		<686	2.84 ¹⁸	
1947	$\text{YtCl}_3 \cdot \text{H}_2\text{O}$	213.380		160		
1948	$\text{Yt}(\text{BrO}_3)_3 \cdot 9\text{H}_2\text{O}$	634.887		74		
1949	$\text{Yt}_2(\text{SO}_4)_3$	466.195			2.612	
1950	$\text{Yt}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	610.318	M.		2.558	661
1951	$\text{Yt}_2\text{O}_3 \cdot \text{P}_2\text{O}_5$ Xenotime	368.048	Tet.		4.6	348
1952	$\text{Yt}_4(\text{P}_2\text{O}_7)_3$	878.144			3.059	
1953	YtCl_3	113.000			4.13	
1954	$\text{Yt}(\text{CH}_3\text{CO}_2)_3 \cdot 4\text{H}_2\text{O}$	338.131	Tri.		1.696	
1955	$\text{Yt}(\text{C}_2\text{H}_5\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	1163.90	H.		1.704 ²⁴	238
1956	$2\text{Yt}_2\text{O}_3 \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$ Thalenite	710.255	M.		4.23	925
1957	$\text{Yt}_2\text{Pt}_2(\text{CN})_{12} \cdot 21\text{H}_2\text{O}$	1453.90	R.		2.376	
1957 1	$\text{Yt}_2(\text{MoO}_4)_3$	658.000		1347	4.79 ¹⁶	415
1958	La_2O_3	325.820		>2000	6.51	
1959	LaCl_3	245.284		907	3.947 ¹⁸	
1960	$\text{LaCl}_3 \cdot 7\text{H}_2\text{O}$	371.392		d. 91		
1961	$\text{La}(\text{BrO}_3)_3 \cdot 2\text{H}_2\text{O}$	558.689		d. 150		
1962	$\text{La}(\text{BrO}_3)_3 \cdot 9\text{H}_2\text{O}$	684.797		37.5		
1963	La_2S_3	203.040		d. 650		
1964	La_2S_4	374.015			4.911 ¹¹	
1965	$\text{La}_2(\text{SO}_4)_3$	566.015			3.606	
1966	$\text{La}_2(\text{SO}_4)_3 \cdot 9\text{H}_2\text{O}$	728.154			2.821	
1967	$(\text{NH}_4)_2\text{La}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	812.281	M.		2.516	
1968	$\text{La}_2\text{O}_3 \cdot 5\text{P}_2\text{O}_5$	1036.06	M.		3.241	
1969	LaCl_3	162.910			5.02	
1970	$\text{La}(\text{C}_2\text{H}_5\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$	1213.81	H.		1.845 ²⁸	224
1971	$\text{Th}_2\text{La}(\text{NO}_3)_3 \cdot 4\text{H}_2\text{O}$	929.812		72 d.	3.318 ⁶	
1972	$\text{Zn}_2\text{La}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1650.43		98.0	2.161 ⁴	
1973	$\text{La}_2\text{Pt}_2(\text{CN})_{12} \cdot 18\text{H}_2\text{O}$	1499.88	M.		2.626	
1974	$\text{Mn}_2\text{La}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1619.08		87.2	2.080 ⁶	
1975	$\text{Co}_2\text{La}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1631.20		101.8	2.131 ⁴	
1976	$\text{Ni}_2\text{La}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1630.36		110.5	2.146 ⁶	
1976 1	$\text{La}_2(\text{MoO}_4)_3$	757.820	Tet.	1181	4.77 ¹⁶	
1977	CeO_2	172.250	C.	1930	7.3	
1978	CeF_3 Fluocerite	197.250	H.	1324	5.8	298
1979	CeCl_3	246.624		848	3.92 ²	
1980	$\text{Ce}(\text{BrO}_3)_3 \cdot 9\text{H}_2\text{O}$	686.137	H.	49		
1981	Ce_2S_3	376.695			5.020 ¹¹	
1982	$\text{Ce}_2(\text{SO}_4)_3$	568.695			3.912	
1983	$\text{Ce}_2(\text{SO}_4)_3 \cdot 5\text{H}_2\text{O}$	658.772	M.		3.17	
1984	$\text{Ce}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	712.818	Tri.	630	2.886 ¹⁷	
1985	$\text{Ce}_2(\text{SO}_4)_3 \cdot 9\text{H}_2\text{O}$	730.834	H.		2.831	
1986	$\text{Ce}_2(\text{S}_2\text{O}_8)_3 \cdot 15\text{H}_2\text{O}$	1031.12	Tri.		2.288	560
1987	Ce_2SeO_4	423.700	R.		4.456	748

Ag	Al	As	Au	B	Ba	Be	Bi	Br	C	Ca	Cl	Co	Cd	Ce	Cu	Cr	Er	Ea	F	Fe	Ga	Gd	Ge	Gr	H	Hf	Hg	Ho	I	In	Ir	K	La	Li	Lu
27	13	33	79	56	55	4	81	35	12	20	17	27	48	58	29	24	68	69	9	26	31	64	62	71	72	73	80	67	53	76	39	57	59	81	75

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.																			
1988	$(\text{NH}_4)_2\text{Ce}(\text{NO}_3)_6 \cdot 4\text{H}_2\text{O}$	558.429	M.	74																					
1989	$(\text{NH}_4)_2\text{SO}_4 \cdot \text{Ce}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	844.961	M.		2.52 ₃																				
1990	CePO_4	235.274			5.2 ₁																				
1991	$\text{Ce}(\text{PO}_3)_3$	377.322			3.27																				
1992	CeC_2	164.250			5.2 ₃																				
1993	$\text{Ce}(\text{C}_2\text{H}_3\text{O}_2)_2$	258.296		308 d.																					
1994	$\text{CeOF} \cdot \text{CeO}_2$ —Bastnäsité	219.250	H.		5.0	346																			
1995	$\text{Ce}(\text{C}_2\text{H}_3\text{SO}_4)_6 \cdot 18\text{H}_2\text{O}$	1215.15	II.		1.930 ₄ ¹⁰	225																			
1996	CeSi_3	196.370			5.67 ₁₇																				
1997	$\text{Th}_2\text{Ce}(\text{NO}_3)_8 \cdot 4\text{H}_2\text{O}$	931.152		61.5 d.	3.326 ₄ ⁹																				
1998	$\text{Zn}_3\text{Ce}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1653.11	Trig.	92.8	2.188 ₄ ⁹																				
1999	$\text{Ce}_2\text{Pt}_2(\text{CN})_{12} \cdot 18\text{H}_2\text{O}$	1502.56	M.		2.057																				
2000	$\text{Mn}_3\text{Ce}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1621.76		83.7	2.102 ₄ ⁹																				
2001	$\text{Co}_3\text{Ce}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1633.88		98.5	2.157 ₄ ⁹																				
2002	$\text{Ni}_3\text{Ce}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1633.04		108.5	2.173 ₄ ⁹																				
2002 1	$\text{Ce}_2(\text{MoO}_4)_3$	760.480	R. Tet.	973	4.83	416																			
2003	$\text{Ce}_2(\text{WO}_4)_3$	1024.50	Tet.	1089	6.77 ₁₄ ⁵																				
2004	$\text{Ce}_2\text{O}_3 \cdot 3\text{Al}_2\text{O}_3 \cdot 2\text{P}_2\text{O}_5 \cdot 6\text{H}_2\text{O}$ —Florencite.	1026.45	Trig.		3.59	337																			
2005	Pr_2O_3	329.840			6.87																				
2006	Pr_2O_7	675.680			6.71 ₅																				
2007	$\text{Pr}_{10}\text{O}_{18}$	1697.20			6.70 ₄																				
2008	PrCl_3	247.294		81.8	4.020 ₁₅ ⁵																				
2009	$\text{Pr}(\text{BrO}_3)_3$	524.668		d. 150																					
2010	$\text{Pr}(\text{BrO}_3)_3 \cdot 9\text{H}_2\text{O}$	680.807	II.	56.5																					
2011	Pr_2S_4	378.035			5.04 ₁₂ ¹¹																				
2012	$\text{Pr}_2(\text{SO}_4)_3$	570.035			3.720 ₁₄ ⁵																				
2013	$\text{Pr}_2(\text{SO}_4)_3 \cdot 5\text{H}_2\text{O}$	660.112	M.		3.17 ₃																				
2014	$\text{Pr}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	714.158	M.		2.82	663																			
2015	$\text{Pr}_2(\text{SeO}_4)_3$	711.440			4.30 ₁₅ ⁵																				
2016	$\text{Pr}_2(\text{SeO}_4)_3 \cdot 8\text{H}_2\text{O}$	855.563			3.094 ₁₅ ⁵																				
2017	PrC_2	164.920			5.1																				
2018	$\text{Pr}(\text{C}_2\text{H}_3\text{SO}_4)_6 \cdot 18\text{H}_2\text{O}$	1215.82	II.		1.876 ₄ ²⁵	226																			
2019	$\text{Zn}_3\text{Pr}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1654.45	Trig.	91.5	2.202 ₄ ⁹																				
2020	$\text{Mn}_3\text{Pr}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1623.10		81.0	2.109 ₄ ⁹																				
2021	$\text{Co}_3\text{Pr}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1635.22		97.0	2.176 ₄ ⁹																				
2022	$\text{Ni}_3\text{Pr}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1634.38		108.0	2.195 ₄ ⁹																				
2023	Nd_2O_3	336.540			7.24																				
2024	NdCl_3	250.644		78.4	4.134 ₄ ²⁵																				
2025	$\text{NdCl}_3 \cdot 6\text{H}_2\text{O}$	358.736		121	2.282 ₄ ¹⁶ ⁵																				
2026	$\text{Nd}(\text{BrO}_3)_3 \cdot 2\text{H}_2\text{O}$	564.019		d. 150																					
2027	$\text{Nd}(\text{BrO}_3)_3 \cdot 9\text{H}_2\text{O}$	690.157	II.	66.7																					
2028	Nd_2S_4	384.735			5.170 ₁₁ ⁷																				
2029	$\text{Nd}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	720.858	M.		2.850	668																			
2030	NdC_2	168.270			5.15																				
2031	$\text{Nd}(\text{C}_2\text{H}_3\text{SO}_4)_6 \cdot 18\text{H}_2\text{O}$	1219.17	II.		1.883 ₄ ²⁵	227																			
2032	$\text{Zn}_3\text{Nd}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1661.15		88.5	2.215 ₄ ⁹																				
2033	$\text{Mn}_3\text{Nd}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1629.80		77.0	2.114 ₄ ⁹																				
2034	$\text{Co}_3\text{Nd}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1641.92		95.5	2.195 ₄ ⁹																				
2035	$\text{Ni}_3\text{Nd}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1641.08		105.0	2.202 ₄ ⁹																				
2035 1	$\text{Nd}_2(\text{MoO}_4)_3$	768.510	Tet.	1176	5.11 ₁₄	414																			
2036	$(\text{NdPr})_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$		M.			658																			
2037	Sn_2O_3	348.860			7.43																				
2038	SnCl_2	221.346			3.69 ₂₂																				
2039	SnCl_4	256.804		68.6	4.46 ₁₅ ⁵																				
2040	$\text{SnCl}_4 \cdot 6\text{H}_2\text{O}$	364.896	Tri.		2.383																				
2041	SnOCl_2	201.888			7.02																				
2042	$\text{SnBr}_3 \cdot 6\text{H}_2\text{O}$	498.270			2.971																				
2043	$\text{Sn}(\text{BrO}_3)_2 \cdot 2\text{H}_2\text{O}$	570.209		d. 150																					
2044	$\text{Sn}(\text{BrO}_3)_2 \cdot 9\text{H}_2\text{O}$	696.317	II.	75																					
2045	Sn_2S_3	397.055			3.7																				
2046	$\text{Sn}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	733.178	M.		2.930	670																			
2047	$\text{Sn}(\text{NO}_3)_4 \cdot 6\text{H}_2\text{O}$	444.546	Tri.		2.375																				
2048	SnPO_4	245.454			5.83 ₁₇ ⁵																				
Mg Mn Mo N	Na Nb Nd Ni O	Os P Pb Pd	Pr Pt Rn	Rb	Rh	Ru	S	Sa	Sb	Se	Si	Sn	Te	Th	Ta	Tb	Ti	Tm	U	V	W	Y	Yb	Zn	Zr
40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2049	SnC_2	174.430			5.86	
2050	$\text{Sn}(\text{CHO})_2$	285.453			3.733	
2051	$\text{Sn}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 4\text{H}_2\text{O}$	399.561			1.94	
2052	$\text{Sn}(\text{C}_2\text{H}_3\text{O}_2)_2$	369.546			1.894	
2053	$\text{Sn}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$	423.592			1.786	
2054	$\text{Sn}(\text{C}_2\text{H}_3\text{SO}_4)_2 \cdot 18\text{H}_2\text{O}$	1225.33	II.		1.904 ²⁵	234
2055	$\text{Zn}_2\text{Sn}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1673.47		76.5	2.283 ²⁵	
2056	$\text{Mn}_2\text{Sn}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1642.12		70.2	2.188 ²⁵	
2057	$\text{Co}_2\text{Sn}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1654.24		83.2	2.237 ²⁵	
2058	$\text{Ni}_2\text{Sn}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1653.40		92.2	2.272 ²⁵	
2059	$\text{Sn}_2\text{O} \cdot \text{B}_2\text{O}_3$	386.500			6.05	
2060	Eu_2O_3	352.000			7.42	
2061	$\text{Eu}(\text{C}_2\text{H}_3\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$	1226.90	II.		1.909 ²⁵	239
2062	Gd_2O_3	362.520			7.407	
2063	GdCl_3	263.634		62.8	4.52 ⁰	
2064	$\text{GdCl}_3 \cdot 6\text{H}_2\text{O}$	371.726			2.424 ²⁵	
2065	$\text{GdBr}_3 \cdot 6\text{H}_2\text{O}$	505.100			2.844 ¹³	
2066	$\text{Gd}_2(\text{SO}_4)_3$	602.715			4.139 ^{14, 6}	
2067	$\text{Gd}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	746.838	M		3.010 ^{14, 6}	
2068	$\text{Gd}(\text{NO}_3)_3 \cdot 5\text{H}_2\text{O}$	433.361		92	2.406 ¹⁵	
2069	$\text{Gd}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$	451.376	Tri.	91	2.332	
2070	$\text{Gd}_2(\text{C}_2\text{O}_4)_3 \cdot 10\text{H}_2\text{O}$	758.674		110		
2071	$\text{Gd}(\text{C}_2\text{H}_3\text{O}_2)_3 \cdot 4\text{H}_2\text{O}$	406.391	Tri.		1.611	
2072	$\text{Gd}(\text{C}_2\text{H}_3\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$	1232.16	II.		1.919 ²⁵	235
2073	$\text{Zn}_3(\text{Gd}_2(\text{NO}_3)_{12})_2 \cdot 24\text{H}_2\text{O}$	1687.13		56.5	2.351 ⁰	
2074	$\text{Gd}_2\text{Pt}_2(\text{CN})_{12} \cdot 24\text{H}_2\text{O}$	1590.63	R		2.563	
2075	$\text{Co}_2(\text{Gd}_2(\text{NO}_3)_{12})_2 \cdot 24\text{H}_2\text{O}$	1667.90		63.2	2.315 ⁰	
2076	$\text{Ni}_2(\text{Gd}_2(\text{NO}_3)_{12})_2 \cdot 24\text{H}_2\text{O}$	1667.06		72.5	2.356 ⁰	
2077	TbCl_3	265.574		58.8	4.35 ⁰	
2078	$\text{Tb}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$	453.316	M	89.3		
2079	Dy_2O_3	373.040			7.81	
2080	DyCl_3	268.894		68.6	3.67 ⁰	
2081	$\text{Dy}(\text{C}_2\text{H}_3\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$	1237.42	II.		1.492 ²⁵	240
2082	Er_2O_3	383.400			8.646	
2083	$\text{Er}_2(\text{SO}_4)_3$	623.595			3.678	
2084	$\text{Er}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	767.718			3.186	
2085	$\text{Er}(\text{C}_2\text{H}_3\text{O}_2)_3 \cdot 4\text{H}_2\text{O}$	416.831	Tri.		2.114	
2086	$\text{Er}(\text{C}_2\text{H}_3\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$	1242.60	II.		1.907 ²⁵	233
2087	Yb_2O_3	395.200			9.17	
2088	$\text{YbCl}_3 \cdot 6\text{H}_2\text{O}$	388.066			2.575	
2089	$\text{Yb}_2(\text{SO}_4)_3$	635.395			3.793	
2090	$\text{Yb}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	779.518			3.286	
2091	$\text{Yb}_2(\text{SeO}_4)_3$	776.800			4.146	
2092	$\text{Yb}_2(\text{SeO}_4)_3 \cdot 8\text{H}_2\text{O}$	920.923			3.36	
2093	$\text{Yb}(\text{NO}_3)_3 \cdot 4\text{H}_2\text{O}$	431.686			2.682	
2094	$\text{Yb}_2(\text{CO}_3)_4 \cdot 4\text{H}_2\text{O}$	599.262			3.67	
2095	$\text{Yb}(\text{C}_2\text{O}_4)_3$	437.600			2.439	
2096	$\text{Yb}(\text{C}_2\text{O}_4)_3 \cdot 10\text{H}_2\text{O}$	617.754			2.644	
2097	$\text{Yb}(\text{C}_2\text{H}_3\text{O}_2)_3 \cdot 4\text{H}_2\text{O}$	422.731			2.09	
2098	LuCl_3	281.374		> 916	3.98	
2099	HfO_2	211.000		281.2	9.68	
2099.5	$\text{HfOCl}_2 \cdot 8\text{H}_2\text{O}$	410.039				270.5
2099.6	$(\text{NH}_4)_3\text{HfF}_7$	366.034	C.			70.1
2100	BeO	25.0200	II.	2400	3.025	347
2101	BeF_2	47.0200			1.2.1 ¹⁵	
2102	$2\text{BeO} \cdot 5\text{BeF}_2$	285.140			2.3	
2103	BeCl_2	79.9360		440	1.809 ²⁵	
2104	BeBr_2	168.852		490		
2105	BeI_2	262.884		510	4.20 ¹⁵	
2106	BeSO_4	105.085			2.443	
2107	$\text{BeSO}_4 \cdot 4\text{H}_2\text{O}$	177.147	Tet.		1.713 ^{10, 3}	219
2108	$\text{BeSeO}_4 \cdot 4\text{H}_2\text{O}$	224.282	R.		2.03	537
2109	Be_3N_2	55.0760		2200		

Ag 37 55 Al 13 33 As 33 Ba 56 80 Bi 83 Br 35 51 C 12 77 Ca 20 40 Cd 48 66 Ce 58 82 Cl 17 35 Co 27 59 Cr 24 52 Cu 29 65 Dy 67 91 Eu 63 93 F 9 Fe 26 56 Ga 31 69 Ge 32 72 H 1 1 Li 3 7 Na 11 23 N 7 14 O 8 16 Pb 82 112 Pt 78 118 Rb 37 85 S 16 32 Se 34 74 Si 14 28 Sn 50 82 Sr 38 88 Ta 73 181 Te 52 84 Th 90 232 Ti 22 48 U 92 238 V 23 51 W 74 182 Xe 54 136 Y 39 89 Zn 30 65

Index No.	Formula	Mol. wt	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2110	Be(NO ₃) ₂ ·3H ₂ O	187 082		60		
2111	Be ₂ C	30 0400			1 915	
2112	Be(C ₂ H ₃) ₂	67 0970				
2113	Be(C ₂ H ₃) ₂	95 1278				
2114	Be(C ₂ H ₃ O ₂) ₂ —Acetylacetonate	207 128	M	108	1 168 ⁴	
2115	BeO·3Be(C ₂ H ₃ O ₂) ₂	170 126		284	1 36 ⁴	
2116	BeO·3Be(C ₂ H ₃ O ₂)(C ₂ H ₃ O ₂)	448 265		127		
2117	BeO·3Be(C ₂ H ₃ O ₂) ₂	490 311		120		
2118	BeO·3Be(C ₂ H ₃ O ₂) ₂	574 403				
2119	BeO·Be(C ₂ H ₃ SO ₄) ₂ ·4H ₂ O	356 309	Tet			220
2120	BeO·SiO ₂	85 0800		> 1755		
2121	2BeO·SiO ₂ —Phenacite	110 100	Tri.		3 0	326
2122	4BeO·2SiO ₂ ·H ₂ O—Bertrandite	238 215	R.		2 6	764
2123	BeOH·BeBO ₃ —Hambergite	93 8677	R.		2 35	733
2124	BeO·Al ₂ O ₃ —Chrysoberyl	126 940	R.		3 76	933
2125	3BeO·Al ₂ O ₃ ·6SiO ₂ —Beryl	537 340	H.	1410	2 60	284
2126	2BeO·Al ₂ O ₃ ·2SiO ₂ ·H ₂ O—Euclase	290 095	M		3 1	839
2127	2BeO·Y ₂ O ₃ ·FeO·2SiO ₂ —Gadolinite	468 000	M.		1 3	947
2128	MgO—Periclase	40 3200	C.	2806	3 65	158
2129	MgO·H ₂ O—Brucite	58 3354	Trig		2 4	272
2130	MgF ₂ —Sellaite	62 3200	Tet	1396	3 0	208
2131	MgCl ₂ —Chloromagnesite	95 2360	H	712	2 325	335
2132	MgCl ₂ ·6H ₂ O—Bischofite	203 328	M.	118 d	1 56	562
2133	Mg(ClO ₄) ₂ ·6H ₂ O	299 328		35	1 80	
2134	Mg(ClO ₄) ₂	223 236		d. 251	2 60 ¹⁰	
2135	Mg(ClO ₄) ₂ ·6H ₂ O	331 328		147	1 970 ¹⁵	
2136	MgBr ₂	184 152		700	3 72	
2137	Mg(BrO ₃) ₂ ·6H ₂ O	388 241	C			117
2138	MgI ₂	278 184			4 25	
2139	Mg(IO ₃) ₂ ·4H ₂ O	446 246	M.		3 3 ¹³⁵	
2140	MgS	56 3850			2 80	
2141	MgSO ₄	120 385		1185	2 66	
2142	MgO·SO ₃ ·H ₂ O—Kieserite	138 400	M.		2 57	637
2143	MgSO ₄ ·5H ₂ O	210 462	Tri.		1 718	511
2144	MgSO ₄ ·6H ₂ O—Hexahydrate	228 477	M.		1 76	
2145	MgO·SO ₃ ·7H ₂ O—Epsomite	246 493	R.		1 68	447
2146	MgS ₂ O ₆ ·6H ₂ O	292 542	Tri.		1 666	
2147	MgSeO ₄ ·6H ₂ O	275 612	M.		1 928	503
2148	MgO·N ₂ O ₅ ·H ₂ O—Nitromagnesite	166 351				558
2149	Mg(N ₂ O ₅) ₂ ·6H ₂ O	256 428		95	1 464	
2150	(NH ₄) ₂ O·MgO·2SO ₃ ·6H ₂ O— Boussingaultite	360 620	M.	> 120	1 70	464
2151	(NH ₄) ₂ O·MgO·2SeO ₃ ·6H ₂ O	454 890	M.		2 04	568
2152	Mg ₂ P ₂ O ₇	222 688			2 598 ²²	761
2153	2MgO·P ₂ O ₅ ·7H ₂ O—Newberyite	348 796	R.		2 40	585
2154	3MgO·P ₂ O ₅ ·8H ₂ O—Bobierite	407 131	M.		2 11	595
2155	Mg(H ₂ PO ₃) ₂ ·6H ₂ O	262 491	Tet		1 59 ¹¹	
2156	3MgO·P ₂ O ₅ ·MgF ₂ —Wagnerite	325 328	M.		3 12	701
2157	(NH ₄) ₂ O·2MgO·P ₂ O ₅ ·12H ₂ O—Struvite	490 950	R.		1 72	522
2158	3MgO·(NH ₄) ₂ O·2P ₂ O ₅ ·10H ₂ O— Hannayite	637 288	Tri.		1 89	703
2159	3MgO·As ₂ O ₅ ·8H ₂ O—Hoernesite	495 003	M.		2 60	702
2160	(NH ₄)MgAsO ₄ ·6H ₂ O	289 411			1 932 ¹⁵	
2161	Mg ₂ Sb ₂	316 500		961		
2162	Mg ₂ Bi ₂	490 960		715		
2163	MgO·CO ₂ —Magnesite	84 3200	Trig		3 037	342
2164	MgO·CO ₂ ·3H ₂ O—Nesquehonite	138 366	R		1 850	542
2165	MgO·CO ₂ ·5H ₂ O—Lansfordite	174 397	M		1 73	459
2166	2MgO·CO ₂ ·4H ₂ O—Artinite	196 702	R.		2 02	630
2167	4MgO·3CO ₂ ·4H ₂ O—Hydromagnesite	365 342	R		2 16	622
2168	Mg(d-C ₄ H ₉ O ₄) ₂ ·5H ₂ O	262 428	M.		1 67	
2169	Mg(d-C ₄ H ₉ O ₄) ₂ ·4H ₂ O	394 459	R.		1 72	
2170	Mg(C ₂ H ₃ O ₂) ₂	142 366		323	1 42	

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Rn Rb Rh Ru S Se Sb Sn Sg Sr Ta Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
76 42 47 11 82 51 61 45 1 35 12 23 41 60 27 80 84 40 39 8 63 14 50 9 18 22 78 52 66 10 24 19 27 70 49 50 48 67 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_{10}°	Ref. ind. finding No.
2171	Mg(C ₈ H ₇ O ₂) ₂ ·4H ₂ O	214.428	M.		1.454	512
2172	Mg(CH ₃ SO ₃) ₂ ·4H ₂ O - Erhane disulfonate	284.542	Tri.		1.727	
2173	MgC ₁₀ H ₆ O ₈ S ₂ ·6H ₂ O - 1, 5-Naphthalene disulfonate	418.589	M.		1.64	777
2174	Mg ₂ Si	76.7000		1102		
2175	MgO·SiO ₂ - Clinostatite	100.380	M.	1557 d.	3.28	836
2176	MgO·SiO ₂ - Enstatite	100.380	R.	d.	3.19	832
2177	2MgO·SiO ₂ - Forsterite	140.700	R.	1890	3.26	828
2178	2MgO·3SiO ₂ ·4H ₂ O - Parasepiolite	332.882	R.			557
2179	3MgO·2SiO ₂ ·2H ₂ O - Chrysotile	277.111	R.		2.5	647
2180	3MgO·3SiO ₂ ·2H ₂ O - Antigone	337.171	R.		2.62	545
2181	3MgO·4SiO ₂ ·H ₂ O - Tale	379.215	M.		2.78	728
2182	MgSiF ₆ ·6H ₂ O	274.472	Trig.			204
2183	2MgO·SiO ₂ ·Mg(F,OH) ₂ - Proectite		M.		3.1	861
2184	4MgO·2SiO ₂ ·Mg(F,OH) ₂ - Chondrodite		M.		3.15	781
2185	6MgO·3SiO ₂ ·Mg(F,OH) ₂ - Humite		R.		3.15	790
2186	8MgO·4SiO ₂ ·Mg(F,OH) ₂ - Clinohumite		M.		3.1	863
2187	MgO·TiO ₂ - Geikielite	120.220	Trig.		3.98	402
2188	MgSnCl ₆ ·6H ₂ O	463.860	Trig.		2.08	289
2189	2(MgPb) ₂ O·SiO ₂ ·H ₂ O - Molybdophyllite		H.		4.72	367
2190	MgCl ₂ ·2CdCl ₂ ·12H ₂ O	678.073	R.			629
2191	MgHg ₂ I ₄ ·7H ₂ O	1313.24			3.80	
2192	MgP(Cl ₄) ₆ ·6H ₂ O	540.390	Trig.		2.437	
2193	MgPtBr ₆ ·12H ₂ O	915.231	Trig.		2.802	
2194	MgPdCl ₆ ·6H ₂ O	451.860	H.		2.12	
2195	Mg ₂ MnCl ₆ ·12H ₂ O	532.503	H.		1.802	
2196	MgO·Fe ₂ O ₃ - Magnesioferrite	200.000	C.		4.6	194
2197	MgO·Fe ₂ O ₃ ·3SiO ₂ ·13H ₂ O - Quetentite	674.395	M.		2.12	626
2198	2MgO·Fe ₂ O ₃ ·4SiO ₂ ·15H ₂ O - Botryogenite	830.811	M.		2.1	660
2199	6MgO·Fe ₂ O ₃ ·CO ₂ ·12H ₂ O - Pyroaurite	661.785	H.		2.07	275
2200	6MgO·Fe ₂ O ₃ ·CO ₂ ·12H ₂ O - Brugnatellite	661.785	H.		2.07	264
2201	3(Fe, Mg)O·Fe ₂ O ₃ ·2SiO ₂ ·3H ₂ O - Cronstedtite		Trig. ?		3.34	363
2202	MgO·CoO ₂	131.290			5.06	
2203	Mg ₂ Ni ₂ O ₃ ·3SiO ₂ ·6H ₂ O - Genthite	486.292	R. ?		2.5	
2204	MgCrO ₄ ·7H ₂ O	266.438	R.		1.695	665
2205	MgO·Cr ₂ O ₃	192.340			4.50	
2206	MgCrO ₄ ·(NH ₄) ₂ CrO ₄ ·6H ₂ O	400.510	M.		1.84	813
2207	6MgO·Cr ₂ O ₃ ·CO ₂ ·12H ₂ O - Stuchite	654.125	H.		2.16	265
2208	MgW ₂ O ₇ ·8H ₂ O	1112.44	M.			926
2209	3MgO·5V ₂ O ₅ ·28H ₂ O	3407.09	Tri.		2.180	
2210	4MgO·C ₂ O ₃	427.480	H.		1.4	
2211	MgO·B ₂ O ₃ ·3H ₂ O - Punnite	164.006	Tet.		2.30	277
2212	2MgO·B ₂ O ₃ ·H ₂ O - Ascharite	168.295			2.7	666
2213	2MgO·B ₂ O ₃ ·H ₂ O - Camsselite	168.295	R. ?			1041
2214	3MgO·B ₂ O ₃	190.600	R.		2.99	833
2215	6MgO·8B ₂ O ₃ ·MgCl ₂ - Bornite impure	894.276	R. C.	Tr. 265 R. to C.	2.9	856
2216	10MgO·4B ₂ O ₃ ·3H ₂ O - Szabulyte	735.806			3	321
2217	6MgO·2B ₂ O ₃ ·2SiO ₂ ·9H ₂ O - Sulfoborite	703.469	R.		2.4	650
2218	3MgO·B ₂ O ₃ ·P ₂ O ₅ ·8H ₂ O - Leuchenbergite	476.771	M.		2.1	649
2219	3MgO·B ₂ O ₃ ·MnO·Mn ₂ O ₃ - Pinakioite	419.390	R.		3.9	999
2220	3MgO·B ₂ O ₃ ·FeO·Fe ₂ O ₃ - Ludwigite	422.120	R.		4.0	972
2221	4MgO·B ₂ O ₃ ·Fe ₂ O ₃ - Magnesioludwigite	390.600	R.		4.0	971
2222	MgO·Al ₂ O ₃ - Spinel	112.240	C.	2135	3.6	156
2223	MgO·Al ₂ O ₃ ·4SiO ₂ ·22H ₂ O - Pickeringite	858.839	M.		1.85	473
2224	6MgO·Al ₂ O ₃ ·CO ₂ ·12H ₂ O - Hydrotalente	604.025	H.		2.06	247
2225	3MgO·Al ₂ O ₃ ·3SiO ₂ - Pyrope	403.060	C.		3.5	154
2226	4MgO·Al ₂ O ₃ ·2SiO ₂ ·5H ₂ O - Colerantite	473.397	H.		2.51	273
2227	5MgO·Al ₂ O ₃ ·3SiO ₂ ·4H ₂ O - Leuchtenbergite	555.762	M.		2.7	726
2228	5MgO·Al ₂ O ₃ ·6SiO ₂ ·4H ₂ O - Zebedassite	735.942			2.19	590
2229	5MgO·6Al ₂ O ₃ ·2SiO ₂ - Sapphirine	933.240	M.		3.45	900
2230	(FeMg)O·Al ₂ O ₃ ·P ₂ O ₅ ·H ₂ O - Lazulite		M.		3.1	804

Ag 25
Al 13
As 33B 54
Be 78
Bi 75
Br 81
S 15C 16
Ca 20
Cb 51
Cd 29
Ce 59Cl 44
Co 46
Cr 31
Cu 85Dy 67
Er 90
Eu 64
F 3
Fe 43Ga 25
Gd 65
Ge 20
Gf 75
H 2Hf 73
Hg 30
Ho 68
I 6
In 26Ir 36
K 83
La 58
Li 81
Lu 73

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2231	Mg ₃ Gd ₃ (NO ₃) ₁₉ ·24H ₂ O	1563.95	Trig.	77.5	2.163 ⁰	
2232	CaO—Lime	56.0700	C.	2572	3.40	168
2233	CaH ₂	42.0854		d. 675	1.7	
2234	Ca(OH) ₂	74.0854	R. Trig.		2.343	318
2235	CaF ₂ —Fluorite	78.0700	C.	1360	3.180	71
2236	CaCl ₂ —Hydrophylite	110.986	C.	772	2.152 ¹ ₄	120
2237	CaCl ₂ ·6H ₂ O	219.078	Trig.	29.92	1.68 ¹⁷	212
2238	CaF ₂ ·CaCl ₂	189.056		d. 737	3.07	
2239	CaBr ₂	199.902		765	3.353 ¹⁸	
2240	CaBr ₂ ·3H ₂ O	253.948	R	80.5		
2241	CaBr ₂ ·6H ₂ O	307.994	H	38.2		
2242	Ca(BrO ₃) ₂ ·H ₂ O	313.917	M	d.	3.329	
2243	CaF ₂ ·CaBr ₂	277.972			3.15 ¹⁸	
2244	CaI ₂	293.934		575	3.956 ¹⁸	
2245	CaI ₂ ·6H ₂ O	402.026		42		
2246	Ca(IO ₃) ₂ —Lautarite	389.934	Tri.		4.591 ¹⁸	
2247	CaS—Oldhamite	72.1350	C.		2.8 ¹⁸	
2248	CaSO ₄ —Anhydrite	136.135	R. M.	Tr. 1193 (R. to M.) M. 1450	2.96	708
2249	CaSO ₄ ·2H ₂ O—Gypsum	172.166	M		2.32	600
2250	CaS ₂ O ₆ ·4H ₂ O	272.262	Trig.		2.176	269
2251	CaSeO ₄	183.270			2.93	
2252	CaSeO ₄ ·2H ₂ O	219.301	M.		2.676	
2253	Ca ₃ N ₂	148.226		900	2.63 ¹⁷	
2254	Ca(NO ₃) ₂	100.086			2.53 ¹⁰ ₄	
2255	Ca(NO ₃) ₂ ·H ₂ O	150.101	H.		2.23 ¹⁴	
2256	Ca(NO ₃) ₂ ·4H ₂ O	204.148			1.674 ⁶	
2257	Ca(NO ₃) ₂ —Nitrocalcite	164.086	C.	561	2.36	
2258	Ca(NO ₃) ₂ ·3H ₂ O	218.132		51.1		
2259	Ca(NO ₃) ₂ ·4H ₂ O (α)	236.148	M.	12.7	1.82	526
2260	Ca(NO ₃) ₂ ·4H ₂ O (β)	236.148		39.7		
2261	Ca ₃ P ₂	182.258		>1600	2.51 ¹⁸	
2262	Ca ₃ P ₂ O ₈	198.118		975	2.82	
2263	Ca ₃ P ₂ O ₇	254.188		1230	3.09	
2264	2CaO·P ₂ O ₅ ·H ₂ O—Monetite	272.204	Tri.	d.	2.75	586
2265	2CaO·P ₂ O ₅ ·5H ₂ O—Brushite	344.265	M.		2.25	656
2266	Ca ₃ (PO ₄) ₂	310.258		1670	3.14	
2267	Ca ₄ P ₂ O ₉	306.328	M.	1630	3.06	148
2268	4CaO·P ₂ O ₅ ·5H ₂ O—Isoclasite	456.405	M.		2.92	698
2269	5CaO·2P ₂ O ₅ ·1.5H ₂ O—Martinite	591.469	M. ?		2.89	765
2270	10CaO·3P ₂ O ₅	986.844		1540	2.89	
2271	Ca(H ₂ PO ₄) ₂	234.149	Tri.	d.	2.546 ¹³ ₄	
2272	Ca(H ₂ PO ₄) ₂ ·H ₂ O	252.164	Tri.	d.	2.220 ¹⁶ ₄	
2273	CaF ₂ ·3Ca ₃ P ₂ O ₈ —Fluorapatite	1008.84	H.	1630	3.18 ²³	309
2274	Ca ₃ P ₂ ClO ₇ —Chlorapatite	520.880		1530	3.17 ²⁰	331
2275	3Ca ₃ (PO ₄) ₂ ·CaFCl—Apatite	1025.30		1276	3.11	308
2276	(NH ₄)CaPO ₄ ·7H ₂ O	279.241	M.	d.	1.561 ¹⁸	
2277	Ca ₃ As ₂	270.130			2.5 ¹⁸	
2278	2CaO·As ₂ O ₅ ·3H ₂ O—Haidingerite	396.106	R.		2.907	756
2279	2CaO·As ₂ O ₅ ·5H ₂ O—Pharmacolite	432.137	M.		2.535	730
2280	2CaO·As ₂ O ₅ ·8H ₂ O—Wapplerite	486.183	Tri.		2.48	621
2281	9CaO·3As ₂ O ₅ ·CaF ₂ —Svabite	1272.16	H.		3.86	345
2282	5CaO·3Sb ₂ S ₃ —Romeite	1491.95	C.		5.04	169
2283	CaC ₂	64.0700		2300	2.22	
2284	CaCO ₃ —Aragonite	100.070	R.		2.93	880
2285	CaCO ₃ —Calcite	100.070	H.	1339 ^{7,9} 00001111	2.711 ^{25,3} ₄	328
2286	CaCO ₃ ·6H ₂ O	208.162	M.			633
2287	CaC ₂ O ₄	128.070			2.24	
2288	CaO·C ₂ O ₃ ·H ₂ O—Whewellite	146.085	M.		2.23	674
2289	Ca(CHO ₂) ₂	130.085	R.	d.	2.015	577
2290	CaC ₄ H ₂ O ₄ ·H ₂ O—Maleate	172.101	R.			706
2291	CaC ₄ H ₂ O ₄ ·2H ₂ O—Fumarate	190.116	R.			754

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Se Sb Sn Sr Ta Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
76 43 47 11 82 51 61 45 1 35 12 23 41 60 37 84 85 40 39 8 63 14 56 9 18 22 78 82 66 10 24 19 27 70 49 50 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No
2292	$\text{CaC}_4\text{H}_4\text{O}_6 \cdot 3\text{H}_2\text{O}$ - Malate	194 147	R.			676
2293	$\text{CaC}_4\text{H}_4\text{O}_6 \cdot 3\text{H}_2\text{O}$ - Succinate	210 147				648
2294	$\text{Ca}(\text{meso-C}_4\text{H}_4\text{O}_6) \cdot 3\text{H}_2\text{O}$	242 147	Tri.			600
2295	$\text{Ca}(\text{d-C}_4\text{H}_4\text{O}_6) \cdot 4\text{H}_2\text{O}?$	260 162	R.			638
2296	$\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$	158 116				683
2297	$\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$ - Lactate	218 147		100		
2298	$\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$ - Crotonate	210 147				695
2299	$\text{CaC}_4\text{H}_6\text{O}_{10} \cdot 6\text{H}_2\text{O}$ - Acid malate	414 239	R.			561
2300	$\text{Ca}(\text{C}_6\text{H}_5\text{CO}_2)_2 \cdot 3\text{H}_2\text{O}$	336 193	R.		1 436	
2301	$\text{CaH}_2(\text{C}_4\text{H}_4\text{O}_6)_2 \cdot 2\text{C}_6\text{H}_5\text{O}_4$ - d-Tetratartarate	638 239	R.		1 851 ¹⁹	
2302	$\text{Ca}_2\text{C}_{12}\text{H}_{12}\text{O}_{12}$ - Acemate	462 256				636
2303	$\text{Ca}_2\text{C}_{12}\text{H}_{12}\text{O}_{14} \cdot 2\text{H}_2\text{O}$ - Citrate	534 318		130		
2304	$\text{Ca}_2\text{C}_{12}\text{H}_{12}\text{O}_{14} \cdot 4\text{H}_2\text{O}$ - Citrate	570 349				618
2305	$\text{Ca}(\text{C}_4\text{H}_2\text{O}_7\text{NO}_2)_2 \cdot x\text{H}_2\text{O}$ - Nitrotetronate		M.		1 745	822
2306	$\text{Ca}(\text{C}_5\text{H}_3\text{NO}_4)_2 \cdot 3\text{H}_2\text{O}$ - Hippurate	450 255	R. ?		1 318	
2307	$7\text{CaO} \cdot \text{CO}_2 \cdot 2\text{P}_2\text{O}_5$ - Dahillite	720 586	H.		3 08	310
2308	$10\text{CaO} \cdot \text{CO}_2 \cdot 3\text{P}_2\text{O}_5$ - Podolite	1030 81	H.		3 077	807
2309	$10\text{CaO} \cdot \text{CaF}_2 \cdot \text{CO}_2 \cdot 3\text{P}_2\text{O}_5 \cdot \text{H}_2\text{O}$ - Francolite	1126 92	H.		3 1	304
2310	CaSi	68 1300			2 35 ¹⁶	
2311	CaSi_2	96 1900			2 5	
2312	Ca_3Si_2	176 330			1 64	
2313	$\text{Ca}_4\text{Si}_{10}$	521 020		1200		
2314	CaSiO_4	116 130	H.		2 89	299
2315	$\text{CaO} \cdot \text{SiO}_2$ - Pseudowollastonite	116 130	M.	1540		773
2316	$\text{CaO} \cdot \text{SiO}_2$ - Wollastonite	116 130	M.	Tr. 1200	2 9	800
2317	$\text{CaO} \cdot 2\text{SiO}_2 \cdot \text{H}_2\text{O}$ - Okenite	194 205	R.		2 3	578
2318	$2\text{CaO} \cdot \text{SiO}_2$ (α)	172 200	M. Tr.	2130		908
2319	$2\text{CaO} \cdot \text{SiO}_2$ (β)	172 200	M. R.	Tr. 1420 β to α		1049
2320	$2\text{CaO} \cdot \text{SiO}_2$ (γ)	172 200	M.	Tr. 675 γ to β		824
2321	$2\text{CaO} \cdot \text{SiO}_2 \cdot \text{H}_2\text{O}$ - Hillebrandite	190 215	R. ?		2 69	772
2322	$2\text{CaO} \cdot 2\text{SiO}_2 \cdot 3\text{H}_2\text{O}$ - Riversidite	286 306			2 61	751
2323	$3\text{CaO} \cdot 2\text{SiO}_2$	288 330	R.	1475 d.		1046
2324	$4\text{CaO} \cdot 4\text{SiO}_2 \cdot 7\text{H}_2\text{O}$ - Crestmonite	590 628			2 22	759
2325	$\text{CaSiF}_6 \cdot 2\text{H}_2\text{O}$	218 161	Tet.		2 25	
2326	$3\text{CaO} \cdot \text{CaF}_2 \cdot 3\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ - Zeophyllite	462 491	Trig.		2 76	276
2327	$3\text{CaO} \cdot \text{CaF}_2 \cdot 2\text{SiO}_2 \cdot \text{H}_2\text{O}$ - Custante	365 415	M.		2 96	732
2328	$5\text{CaO} \cdot \text{SiO}_2 \cdot \text{P}_2\text{O}_5$	482 158		1760	3 01	
2329	$3\text{CaO} \cdot \text{SiO}_2 \cdot \text{CO}_2 \cdot 8\text{O}_2 \cdot 15\text{H}_2\text{O}$ - Thaumussite	622 566	H.		1 87	243
2330	$5\text{CaO} \cdot 2\text{SiO}_2 \cdot \text{CO}_2$ - Spurrite	444 470	M. ?		3 01	867
2331	$\text{CaO} \cdot \text{TiO}_2$ - Perovskite	135 970	R.		4 10	1025
2332	$\text{CaTi}(\text{SO}_4)_3$	376 165	C.			91
2333	$5\text{CaO} \cdot 2\text{TiO}_2 \cdot 3\text{SiO}_2$ - Lewisite	1410 77	C.		4 95	184
2334	$\text{CaO} \cdot \text{TiO}_2 \cdot \text{SiO}_2$ - Titanite	196 030	M.	1142	3 5	983
2335	$\text{CaO} \cdot \text{SnO}_2 \cdot 3\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ - Stokesite	422 981	R.		3 2	776
2336	$\text{Ca}_2\text{PbC}_4\text{H}_{10}\text{O}_{12}$ - Propionate	725 571	Tet.			251
2337	$2\text{CaO} \cdot \text{PbO} \cdot 3\text{SiO}_2$	515 520			3 99	955
2338	$4\text{CaO} \cdot 6\text{PbO} \cdot 6\text{SiO}_2 \cdot \text{H}_2\text{O}$ - Ganomalite	1902 86	Tet.		5 74	985
2339	$4\text{CaO} \cdot 5\text{PbO} \cdot \text{PbCl}_2 \cdot 6\text{SiO}_2$ - Nasonite	1978 76	H.		5 7	380, 384
2340	$\text{CaO} \cdot \text{ZnO} \cdot \text{SiO}_2 \cdot \text{H}_2\text{O}$ - Chmohedrite	215 525	M.		3 33	862
2341	$2\text{CaO} \cdot \text{ZnO} \cdot \text{SiO}_2$ - Hardystonite	253 580	Tet.		3 4	332
2342	CaHgI_4	748 108			3 36 ⁶	
2343	$\text{CaHg}_2\text{I}_{12} \cdot 8\text{H}_2\text{O}$	2710 43			4 69 ⁹	
2344	$\text{Ca}_3\text{Hg}_4\text{I}_{14} \cdot 24\text{H}_2\text{O}$	3132 07			3 61 ⁹	
2345	$\text{CaSO}_4 \cdot 3\text{Cu}(\text{OH})_2 \cdot \text{CuSO}_4 \cdot 3\text{H}_2\text{O}$ - Urvolyte	574 542	R.		3 132	
2346	$2\text{CaO} \cdot 2\text{CuO} \cdot \text{As}_2\text{O}_5 \cdot \text{H}_2\text{O}$ - Higginsite	519 215	R.		4 33	965
2347	$\text{CaCu}(\text{C}_2\text{H}_3\text{O}_2)_4 \cdot 6\text{H}_2\text{O}$	357 718	Tet.		1 42	213
2348	$\text{CaPt}(\text{CN})_4 \cdot 5\text{H}_2\text{O}$	429 409	R.			1045
2349	$2\text{CaO} \cdot \text{MnO} \cdot \text{P}_2\text{O}_5 \cdot 2\text{H}_2\text{O}$ - Fairfieldite	361 149	Tri.		3 07	823
2350	$2\text{CaO} \cdot \text{MnO} \cdot \text{As}_2\text{O}_5 \cdot 2\text{H}_2\text{O}$ - Brandtite	449 021	Tri.		3 671	902
2351	$\text{CaO} \cdot \text{MnO} \cdot \text{SiO}_2$ - Glaucocochroite	187 060	R.		3 41	910

Ag 57 58 13 33

B 64 65 75 15 5

C 66 67 51 29 59

Cl 68 69 53 31

Dy 69 69 64 3 43

Ga 69 69 69 75 2

Hf 73 73 68 6 26

Ir 73 73 68 6 26

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2352	4CaO.2Mn ₂ O ₃ .5SiO ₂ .4H ₂ O—Orientite.	912 362	R.			
2353	4CaSiO ₃ .3MnSiO ₃ —Bustamite	857 490	Tri.		3 1	943
2354	CaO.Fe ₂ O ₃	215 750		1216 d.		808
2355	2CaO.Fe ₂ O ₃	271 820		1436 d		408
2356	2CaO.FeO.P ₂ O ₅ .4H ₂ O—Anapaite	398 090	Tri.		2 8 ₂	1057
2357	6CaO.3Fe ₂ O ₃ .4P ₂ O ₅ .19H ₂ O—Calcioferrite	1725 94	M.		2 53	778
2358	3CaO.2Fe ₂ O ₃ .2As ₂ O ₃ .6H ₂ O— Arseniosiderite	1055 50	R.		3 36	282
2359	FeCa ₂ (CN) ₆ .12H ₂ O	508 212	Tri.			376
2360	CaO.FeO.2SiO ₂ —Hedenbergite	248 030	M.	1100	3 7	718
2361	2CaO.4FeO.Fe ₂ O ₃ .4SiO ₂ .H ₂ O—Ilvaite.	817 435	R.		4 0	922
2362	CaO.Cr ₂ O ₃	208 090			4 8 ¹⁵	984
2363	15CaO.8CrO ₃ .7I ₂ O ₅ —Dietzite	397 818	M.		3 70	970
2364	3CaO.Cr ₂ O ₃ .3SiO ₂ —Uvarovite	500 410	C.		3 12	170
2365	CaMoO ₄ —Powellite	200 070	Tet.		4 35	388
2366	CaO.WO ₃ —Scheelite	288 070	Tet.		6 06	381
2367	CaO.8UO ₃ .2SO ₃ .25H ₂ O—Uranopilite	2505 56	Tri. ?		3 8	788
2368	CaO.2UO ₃ .P ₂ O ₅ .8H ₂ O—Autumite	914 581	R.		3 1	707
2369	CaO.2UO ₃ .P ₂ O ₅ .8H ₂ O—Bassetite	914 581	M.		3 10	705
2370	CaO.2UO ₃ .As ₂ O ₃ .8H ₂ O—Uranospinite.	1002 45	R.		3 45	719
2371	2CaO.UO ₃ .4CO ₂ .10H ₂ O—Uranothallite.	738 464	R.		2 8	547
2372	CaO.2UO ₃ .2SiO ₂ .6H ₂ O—Uranophane	856 622	Tri. ?		3 9	855
2373	CaV ₄ O ₁₁	419 910		637		
2374	CaO.3V ₂ O ₅ .9H ₂ O—Hewettite	763 969	R.		2 554	1011
2375	CaO.3V ₂ O ₅ .9H ₂ O—Metahewettite	763 969	R.		2 51	1003
2376	2CaO.3V ₂ O ₅ .11H ₂ O—Pascoite	856 069	M.		2 46	961
2377	CaCl ₂ .Ca ₃ (VO ₄) ₂	461 116	R.		4 01	
2378	CaB ₆	104 990			2 3	
2379	CaO.B ₂ O ₃	125 710	R.	1100		841
2380	2CaO.B ₂ O ₃	181 780		1304		
2381	2CaO.3B ₂ O ₃ .5H ₂ O—Colemanite	411 137	M.	d.	2 43	739
2382	2CaO.3B ₂ O ₃ .7H ₂ O—Meyerhofferite	447 168	Tri.	d.	2 12	635
2383	2CaO.3B ₂ O ₃ .13H ₂ O—Inyoite	555 260	M.	d.	1.875	570
2384	4CaO.5B ₂ O ₃ .9H ₂ O—Pandermitte	731 619	M.	d.	2 43	738
2385	5CaO.6B ₂ O ₃ .9H ₂ O—Priceite	860 329	Tri.		2 1	735
2386	CaO.2SiO ₂ .B ₂ O ₃ —Danburite	245 830	R.		3 0	806
2387	2CaO.2SiO ₂ .B ₂ O ₃ .H ₂ O—Datolite	319 915			3 0	831
2388	4CaO.5B ₂ O ₃ .2SiO ₂ .5H ₂ O—Howlite	782 677	M.		2 6	746
2389	8CaO.5B ₂ O ₃ .6SiO ₂ .6H ₂ O—Bakerite	1265 21			2 8	721
2390	CaO.B ₂ O ₃ .SnO ₂ —Nordenskiöldine	276 410	Trig.		4 2	
2391	CaO.Al ₂ O ₃	157 990	M. ? Tri.	1600		838
2392	3CaO.Al ₂ O ₃	270 430	C.	1535 d		155
2393	3CaO.5Al ₂ O ₃	677 810	Tet. ? R.	1720		300
2394	5CaO.3Al ₂ O ₃	586 110	C.	1455		141
2395	CaF ₂ .Al(F, OH) ₃ .H ₂ O—Gearksutite		M.		2 77	445
2396	CaF ₂ .2Al(F, OH) ₃ .H ₂ O—Prosopite		M. Tri.		2 88	548
2397	6CaO.Al ₂ O ₃ .3SO ₃ .33H ₂ O—Ettringite	1273 04	H.		1 75	231
2398	CaO.2CaF ₂ .2Al(F, OH) ₃ .8O ₂ .2H ₂ O— Creedite		M.		2 73	470
2399	CaO.2Al ₂ O ₃ .P ₂ O ₅ .5H ₂ O—Crandallite	492 035	R.		3 5	294
2400	CaO.Al ₂ O ₃ .2SiO ₂ —Anorthite	278 110	Tri.	1551	2 765	723
2401	CaO.Al ₂ O ₃ .2SiO ₂ .2H ₂ O—Hibschite..	314 141	C.		3 05	149
2402	CaO.Al ₂ O ₃ .2SiO ₂ .2H ₂ O—Lawsonite.	314 141	R.		3 09	869
2403	CaO.Al ₂ O ₃ .3SiO ₂ .5H ₂ O—Levyntite	428 247	Trig.		2 1	241
2404	CaO.Al ₂ O ₃ .4SiO ₂ .4H ₂ O—Giamondite	470 292		1550	2 3	644
2405	CaO.Al ₂ O ₃ .4SiO ₂ .4H ₂ O—Laumontite	470 292	M.		2 3	605
2406	CaO.Al ₂ O ₃ .6SiO ₂ .5H ₂ O—Epistilbite	608 427	M.		2 25	572
2407	CaO.Al ₂ O ₃ .6SiO ₂ .5H ₂ O—Heulandite.	608 427	M.		2 2	528
2408	CaO.Al ₂ O ₃ .7SiO ₂ .7H ₂ O—Stellerite . .	704 518	R.		2.12	509
2409	CaO.2Al ₂ O ₃ .2SiO ₂ .H ₂ O—Margarite	398 045	M.		3 0	820
2410	2CaO.Al ₂ O ₃ .SiO ₂ —Velardentite..	274 120	Tet.	1590	3.04	333
2411	2CaO.Al ₂ O ₃ .3SiO ₂ .H ₂ O—Prehnite . .	412 255	R.		2.9	796
2412	2CaO.Al ₂ O ₃ .5SiO ₂ .6H ₂ O—Laubantite	622 452	M. ?		2.2	221

Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O	Os	P	Pb	Pd	Pr	Pt	Ra	Rb	Rh	Ru	S	Sa	Sb	Se	Si	Sn	Sr	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr	
76	42	47	11	82	51	61	45	1	35	12	23	41	60	37	80	84	40	39	8	63	14	56	9	18	22	78	62	66	10	24	19	27	70	49	50	48	57	71	28	21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.																																																												
2413	$2\text{CaO} \cdot 3\text{Al}_2\text{O}_3 \cdot 9\text{SiO}_2$ —Didymohite	958.440	M.		2.71	540																																																												
2414	$3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 8\text{SiO}_2$. .	330.190	R.			1048																																																												
2415	$3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 3\text{SiO}_2$ —Grossularite	450.310	C.		3.530	157																																																												
2416	$3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Bavenite	648.505	M.		2.72	717																																																												
2417	$4\text{CaO} \cdot 3\text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$ —Meionite.	890.400	Tet.		2.74	295																																																												
2417.1	$4\text{CaO} \cdot 3\text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Clinzoisite	908.415	M.		3.36	915																																																												
2418	$4\text{CaO} \cdot 3\text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Zoisite	908.415	R.		3.3	896																																																												
2419	$3\text{CaO} \cdot 5\text{CaO} \cdot 6\text{P}_2\text{O}_5 \cdot 24\text{H}_2\text{O}$ —Churchite	3095.37	M.		3.14	785																																																												
2420	$\text{CaO} \cdot 2\text{C}_2\text{O}_3 \cdot \text{F}_2 \cdot 3\text{CO}_2$ —Parisite	538.570	Trig.		4.32	279																																																												
2421	$\text{Ca}_3\text{PO}_4 \cdot \text{BeOH}$ —Hydro-herderite	161.122	R.		3.00	774																																																												
2422	$\text{CaCl}_2 \cdot 2\text{MgCl}_2 \cdot 12\text{H}_2\text{O}$ —Tachyhydrate	517.643	H.	> 168 d.	1.66s	249																																																												
2423	$2\text{CaO} \cdot 2\text{MgO} \cdot \text{As}_2\text{O}_3 \cdot \text{H}_2\text{O}$ —Adeleite	440.715	M.		3.76	909																																																												
2424	$2\text{CaO} \cdot \text{MgO} \cdot \text{As}_2\text{O}_3 \cdot \text{MgF}_2$ —Tilasite	425.700	M.		3.28	847																																																												
2425	$\text{CaO} \cdot \text{MgO} \cdot 2\text{CO}_2$ —Dolomite	184.390	Trig.		2.872	330																																																												
2426	$\text{CaO} \cdot \text{MgO} \cdot \text{SiO}_2$ —Monticellite	156.450	R.	d. 1498	3.2	852																																																												
2427	$\text{CaO} \cdot \text{MgO} \cdot 2\text{SiO}_2$ —Diopside	216.510	M.	1391	3.3	864																																																												
2428	$\text{CaO} \cdot 3\text{MgO} \cdot 2\text{SiO}_2$ —Merwinite	297.150	M.		3.15	901																																																												
2429	$\text{CaO} \cdot 3\text{MgO} \cdot 4\text{SiO}_2$ —Tremolite	417.270	M.		3.0	786																																																												
2430	$2\text{CaO} \cdot \text{MgO} \cdot 2\text{SiO}_2$ —Äkermanite	272.580	Tet.	1458	2.944	307																																																												
2431	$5\text{CaO} \cdot 2\text{MgO} \cdot 6\text{SiO}_2$	721.350		d. 1365		797																																																												
2432	$\text{CaO} \cdot \text{MgO} \cdot 3\text{B}_2\text{O}_3 \cdot 6\text{H}_2\text{O}$ —Hydroboracite	413.402	M.		2.0	631																																																												
2433	$\text{CaO} \cdot \text{MgO} \cdot \text{Al}_2\text{O}_3 \cdot \text{SiO}_2$ —Gehlenite	258.370	Tet.		3.04	330																																																												
2434	SrO	103.620	R.	2430	4.7																																																													
2435	$\text{Sr}(\text{OH})_2$	121.635			3.625																																																													
2436	$\text{Sr}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$	265.758	Tet.		1.90	242																																																												
2437	SrF_2	125.620	C.	1190	2.44																																																													
2438	SrCl_2	158.536	C.	873	3.052	140																																																												
2439	$\text{SrCl}_2 \cdot 6\text{H}_2\text{O}$	266.628	Trig.	d. 61	1.93	257																																																												
2440	$\text{Sr}(\text{ClO}_4)_2$	254.536	R.	120 d.	3.152	763																																																												
2441	$\text{SrF}_2 \cdot \text{SrCl}_2$	234.156	Tet.	962	4.18	324																																																												
2442	SrBr_2	247.452		643	4.216 ²⁴																																																													
2443	$\text{SrBr}_2 \cdot 6\text{H}_2\text{O}$	355.544		d. 20	2.358 ¹⁸																																																													
2444	$\text{Sr}(\text{BrO}_3)_2 \cdot \text{H}_2\text{O}$	361.467	M.	d.	3.773																																																													
2445	$\text{SrBr}_2 \cdot \text{SrF}_2$	373.072			4.06																																																													
2446	SrI_2	341.484		402	4.549 ²⁸																																																													
2447	$\text{Sr}(\text{IO}_3)_2$	437.484	Tri.		5.045 ¹⁹																																																													
2448	$\text{SrI}_2 \cdot \text{SrF}_2$	467.104			4.5																																																													
2449	SrS	119.685	C.		3.70 ¹⁵																																																													
2450	$\text{SrS}_4 \cdot 6\text{H}_2\text{O}$	323.972		25																																																														
2451	$\text{SrO} \cdot \text{SO}_2$ —Celestine	183.685	R.	1580 d.	3.96	789																																																												
2452	$\text{SrS}_2 \cdot \text{O}_2 \cdot 5\text{H}_2\text{O}$	289.827	M.	d.	2.17 ¹⁷																																																													
2453	$\text{SrS}_2 \cdot \text{O}_4 \cdot 4\text{H}_2\text{O}$	319.812	Trig.		2.373	253																																																												
2454	$\text{Sr}(\text{NO}_3)_2$	147.636			2.683																																																													
2455	$\text{Sr}(\text{NO}_3)_2 \cdot 5\text{H}_2\text{O}$	237.713			2.173 ²⁰																																																													
2456	$\text{Sr}(\text{NO}_3)_2$	179.636			2.867 ²⁷																																																													
2457	$\text{Sr}(\text{NO}_3)_2 \cdot \text{H}_2\text{O}$	197.651		d.	2.408 ²⁹																																																													
2458	$\text{Sr}(\text{NO}_3)_2$	211.636	C.	570	2.986	135																																																												
2459	$\text{Sr}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$	283.698	M.		2.2																																																													
2460	Sr_3P_2	324.908			2.68																																																													
2461	SrHPO_4	183.652	R.		3.544																																																													
2462	SrC_2	111.620			3.2																																																													
2463	$\text{SrO} \cdot \text{CO}_2$ —Strontianite	147.620	R.	1497 ²⁶ nt	3.70	853																																																												
2464	$\text{Sr}(\text{C}_2\text{H}_3\text{O}_2)_2$. .	177.635	R.	71.9	2.69	704																																																												
2465	$\text{Sr}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot \text{H}_2\text{O}$	195.651	R.		2.25																																																													
2466	$\text{Sr}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 2\text{H}_2\text{O}$	213.666	R.		2.69s	597																																																												
2467	$\text{Sr}(\text{C}_2\text{H}_3\text{O}_2)_2$	205.666			2.099																																																													
2468	$\text{Sr}(\text{C}_2\text{H}_3\text{SO}_3)_2 \cdot \text{H}_2\text{O}$ —Ethane disulfonate.	293.796	M.		2.355 (α) 2.453 (β)																																																													
2469	$\text{Sr}(\text{C}_2\text{H}_3\text{O}_2\text{S})_2 \cdot 2\text{H}_2\text{O}$ —Ethylsulfate	373.858	M.		2.032	554																																																												
2470	$\text{Sr}(\text{C}_2\text{H}_3\text{O}_2\text{NO}_2)_2 \cdot \text{H}_2\text{O}$ —Nitroteronate		M.		2.043	812																																																												
2471	$\text{Sr}(\text{SiO}_3\text{C}_2\text{H}_4\text{O}_6)_2$	627.222	H.			426																																																												
2472	SrSiO_3	163.680		1580	3.65	60																																																												
2473	$2\text{SrO} \cdot \text{SiO}_2$	267.300		> 1700	3.84																																																													
Ag 33	Al 56	As 33	Au 33	B 8	Be 9	Br 35	Bz 13	C 12	Ca 40	Cb 98	Cl 35	Cs 132	Co 59	Cr 52	Cu 63	Cd 112	Ce 140	Cf 175	Fe 56	F 19	Fr 223	Ga 70	Ge 73	Gr 160	H 1	He 4	Hf 178	Hg 201	Ho 164	I 127	La 139	Li 7	Lu 175	Mn 55	Mo 96	N 14	Ne 20	Ni 59	Os 190	P 31	Pb 207	Pr 140	Re 186	Rh 103	Rn 222	S 32	Sa 227	Se 79	Si 28	Sm 150	Sr 88	Ta 182	Tb 159	Tl 204	Tm 169	Ti 48	Tl 204	U 238	V 51	Va 223	W 184	Xe 131	Y 89	Yb 173	Zn 65	Zr 91

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2474	SrSiF ₆ ·2H ₂ O	265.711	M.		2.9017 ⁸	
2475	SrCl ₂ ·2CdCl ₂ ·7H ₂ O	651.296	M.		2.718 ²⁴	
2476	SrHg ₄ I ₁₂ ·8H ₂ O	2757.98			4.06 ⁹	
2477	Sr ₂ Cu(CHO ₂) ₄ ·8H ₂ O	562.964	Tri.			593
2479	SrCrO ₄	203.630	M.		3.8051 ¹⁵	
2480	SrCr ₂ O ₇ ·3H ₂ O	357.686	M.			905
2481	Sr(OCrO ₂ Cl) ₂ ·4H ₂ O	430.618		72		
2482	SrMoO ₄	247.620			4.145	
2483	SrWO ₄	335.620			6.181	
2484	Sr ₂ W ₁₂ SiO ₄₀ ·16H ₂ O	3339.55	M.		3.3	934
2485	SrB ₆	152.540				
2486	SrO·B ₂ O ₃	173.260		1100		
2487	SrO·2B ₂ O ₃	242.900		930		
2488	2SrO·B ₂ O ₃	276.880		1130		
2489	2SrO·3Al ₂ O ₃ ·2P ₂ O ₅ ·7H ₂ O—Goyazite	923.204	Trig		3.2	305
2490	2SrO·3Al ₂ O ₃ ·P ₂ O ₅ ·6H ₂ O—Svanbergite	923.270	Trig		3.5	314
2491	SrO·Al ₂ O ₃ ·2SiO ₂	325.660		>1700		
2492	3SrO·2Ce ₂ O ₃ ·7CO ₂ ·5H ₂ O—Ancyrite	1365.94	R.		3.05	974
2493	SrCa ₂ C ₁₅ H ₃₀ O ₁₈ —Propionate	605.991	Tet.			230
2494	BaO	153.370	C.	1923	5.72	
2495	BaO ₂	169.370			4.96	
2496	BaH ₂	139.385		d. 675	4.21 ⁹	
2497	Ba(OH) ₂	171.385	M.		4.495	
2498	Ba(OH) ₂ ·8H ₂ O	315.509	M.	77.9	2.13	544
2499	BaF ₂	175.370	C.	1280	4.83	
2500	BaCl ₂	208.286	M.	Tr. 925	3.8504 ⁴	
			C.	902		
2501	BaCl ₂ ·2H ₂ O	244.317	R.		3.0077 ²⁴	825
2502	Ba(ClO) ₂	240.286		d. 235		
2503	Ba(ClO ₃) ₂	304.286		414		
2504	Ba(ClO ₃) ₂ ·H ₂ O	322.301	M.	d. 120	3.179	713
2505	Ba(ClO ₄) ₂	336.286		505		
2506	Ba(ClO ₄) ₂ ·3H ₂ O	390.332	H.		2.74	
2507	BaClF	191.828	Tet.	1008	5.931	315
2508	BaCl ₂ ·BaF ₂	383.656			4.51 ¹⁸	
2509	BaBr ₂	297.202		847	4.7814 ⁴	
2510	BaBr ₂ ·2H ₂ O	333.233	M.		3.5824 ⁴	913
2511	Ba(BrO ₃) ₂ ·H ₂ O	411.217	M.		3.991 ¹⁸	
2512	BaBr ₂ ·BaF ₂	472.572			4.061 ¹⁸	
2513	BaI ₂	391.234		740 d.	5.151	
2514	BaI ₂ ·6H ₂ O	499.326	H.	25.7		
2515	BaI ₂ ·7H ₂ O	517.342			3.07	
2516	Ba(IO ₃) ₂	487.234	M.		5.23	
2517	Ba(IO ₃) ₂ ·H ₂ O	505.249	M.		5.01 ¹⁵	
2518	BaI ₂ ·BaF ₂	566.604			5.211 ¹⁸	
2519	BaS	169.435	C.		4.251 ¹⁵	
2520	BaS ₄ ·2H ₂ O	301.661	R.	d.	2.988	
2521	BaO·SO ₃ —Barite	233.435	R.	Tr. 1149 to M. ? 1580	4.4901 ¹⁵	816
2522	BaS ₂ O ₃ ·H ₂ O	267.515	R.		3.451 ¹⁸	
2523	BaS ₂ O ₆ ·2H ₂ O	333.531	R. M.		4.5301 ¹⁵	744
2524	BaS ₂ O ₆ ·4H ₂ O	369.562	M.		3.142	1076
2525	BaSeO ₄	280.570	R.	d.	4.75	
2526	BaTeO ₄	328.870			4.481 ¹⁵	
2527	BaN ₆	221.418	R.	d. 219		
2528	Ba(NO ₂) ₂	197.386			3.891 ²³	
2529	Ba(NO ₂) ₂	229.386		217	3.23 ²³	
2530	Ba(NO ₂) ₂ ·H ₂ O	247.401			3.173 ²⁹	
2531	Ba(NO ₃) ₂ —Nitrobarite	261.386	C.	592	3.244 ²²	137
2532	Ba(NH ₂) ₂	169.417		280		
2533	Ba ₃ P ₂ O ₇	448.788	R.		4.11 ¹⁸	
2534	Ba ₃ (PO ₄) ₂	602.158	C.		4.11 ¹⁸	

Mg 78 43 47 11 Na 83 51 61 45 1 Nb 85 12 33 41 Ni 86 00 37 30 84 Cu 87 40 39 8 63 P 88 14 56 9 18 22 Pb 89 78 53 56 10 24 Fe 89 19 27 70 49 80 Pt 89 71 28 21 Rb 89 48 57 71 28 21

Index No.	Formula	Mol. wt	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2535	BaHPO ₄	233 402	R.		4 165 ¹⁴	
2536	BaH ₄ (PO ₃) ₂ · H ₂ O	285 464	M.		2 90 ¹⁷	
2537	BaF ₂ · 3Ba ₃ P ₂ O ₄	1981 84	H.	1670		334
2538	BaCl ₂ · 3Ba ₃ P ₂ O ₄	2014 76	H.	1584	5 949	343
2539	Ba ₃ As ₂	562 030			4 1 ¹⁸	
2540	BaHAsO ₄ · H ₂ O	295 353	R. M.		3.93 ¹⁵	
2541	BaC ₂	161 370			3.75	
2542	BaCO ₃ Witherite	197 370	R.	Tr. 811 to α	4.43	875
2543	BaCO ₃ (α)	197 370	H.	Tr. 982 to β		
2544	BaCO ₃ (β)	197 370		1740 ⁹⁰ at		
2545	BaC ₂ O ₄	225 370			2 658	
2546	Ba(C ¹ HO) ₂	227 385	R.		3 21	745
2547	BaC ₂ H ₂ O ₄ Malonate	239 385			2 147 ¹⁴	
2548	Ba(meso-C ₄ H ₄ O ₆) · H ₂ O	303 416			2 98	
2549	Ba(all-C ₄ H ₄ O ₆) · 5H ₂ O	375 478	M.			1051
2550	Ba(C ₂ H ₂ O ₄) ₂	255 416			2 468	
2551	Ba(C ₂ H ₂ O ₄) ₂ · H ₂ O	273 432	Tri.		2 19	582
2552	Ba(C ₂ H ₂ O ₄) ₂ · 3H ₂ O	309 462	Tri.		2 021	
2553	Ba(C ₂ H ₂ CO ₄) ₂ · H ₂ O	301 162	R.			584
2554	Ba(C ₂ H ₂ SO ₄) ₂ Ethane disulfonate	325 531	R.		2 779	
2555	BaC ₈ H ₆ O ₈ S ₂ · H ₂ O - Phenol-2, 4-disulfonate	461 592	M.			767
2556	BaC ₁₀ H ₆ O ₈ S ₂ · H ₂ O - Naphthalene-1, 5-disulfonate	441 562	R.		2 282	904
2557	BaSiO ₄	213 430		1604	4 399	872
2558	BaSiO ₃ · 6H ₂ O	321 522	R.		2 59	659
2559	BaO · 2SiO ₂	273 490	R.	1120	3.73	775
2560	2BaO · SiO ₂	366 800		> 1755		1052
2561	2BaO · 3SiO ₂	486 920		1450	3 93	795
2562	BaSiF ₆	279 430			4 279 ¹⁵	
2563	BaO · TiO ₂ · 3SiO ₂ Benitoite	413 450	H.		3 7	356
2564	BaCdCl ₄ · 4H ₂ O	463 674	Tri.		2 968	827
2565	BaCdBr ₄ · 4H ₂ O	641 506	Tri.		3 687	894
2566	BaCd(CH ₃ CO ₂) ₄ · 2H ₂ O	465 842	M.			627
2567	BaHg ₂ I ₄ . . .	2692 60			4 63 ⁰	
2568	Ba ₂ Hg ₃ I ₁₆ · 16H ₂ O	3734 32			4 06	
2569	BaPtBr ₆ · 10H ₂ O	992 250	M.		3 713	
2570	BaPt(CN) ₄ · 4H ₂ O	508 694	M.		3 05	1047
2571	BaO · MnO ₂	240 300			5 85	
2572	BaO · FeO · 4SiO ₂ - Gillespite	465 450	Trig.		3 33	302
2573	4BaO · FeO · 2Fe ₂ O ₃ · 10SiO ₂ - Turamellite	1605 28	R.		3 92	942
2574	BaNi ₂ O ₆	331 750			4 8	
2575	Ba ₃ CrO ₄	253 380			4 498 ¹⁵	
2576	Ba ₃ [Cr(C ₂ O ₄) ₃] ₂	1044 13			2 57	
2577	Ba ₃ [Cr(C ₂ O ₄) ₃] ₂ · 7H ₂ O	1170 24			2 896 ²⁸	
2578	Ba ₃ [Cr(C ₂ O ₄) ₃] ₂ · 12H ₂ O	1260 31			2 372 ²⁷	
2579	BaMoO ₄	297 370			1 65	
2580	BaWO ₄	385 370			6 35	
2581	BaO · 4WO ₃ · 9H ₂ O	1243 51	R		4 30	
2582	Ba ₂ W ₁₂ SiO ₄₀ · 16H ₂ O	3439 05	M			962
2583	BaO · 2UO ₃ · P ₂ O ₅ · 8H ₂ O - Uranocerite	1011 88	R.		3 53	787
2584	Ba ₂ V ₂ O ₇	488 660		ca. 863		
2585	3BaO · 10WO ₃ · V ₂ O ₅ · SiO ₂ · 28H ₂ O	3526 52			3 66	
2586	BaBa	202 290			4 36	
2587	BaO · B ₂ O ₃ . .	223 010		1060		
2588	2BaO · B ₂ O ₃ . .	376 380		1002		
2589	3BaO · B ₂ O ₃ . .	529 750		1315		
2590	BaCl ₂ · 2AlCl ₃ . .	474 954		290		
2591	BaO · Al ₂ O ₃ · 2SiO ₂ - Celsian	375 410	M.	> 1700	3 37	727
2592	BaO · Al ₂ O ₃ · 3SiO ₂ · 3H ₂ O - Edingtonite	435 470	R.		2 7	662
2593	4BaO · Al ₂ O ₃ · 7SiO ₂ - Barylite	1135 82	R.		4 03	884
2594	BaF ₂ · C ₂ O ₃ · 3C ₂ O ₃ - Cordylite	635 870	H.		4 31	357
2595	BaO · CaO · 2CO ₂ - Barytoacelite	297 440	M.		3 65	828

Ag	Al	As	Au	B	Ba	Be	Bi	Br	C	Ca	Cb	Cd	Ce	Cl	Co	Cr	Cs	Cu	Dy	Er	Fa	F	Fe	Ga	Gd	Ge	Gl	H	Hf	Hg	Ho	I	In	Ir	K	La	Li	Lu
85	13	33		54	79	75	15	5	10	77	51	29	59	44	44	46	85	31	67	69	64	3	43	25	65	29	75	2	73	30	68	6	26	36	83	53	51	72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2596	BaCa ₂ C ₁₂ H ₃₀ O ₁₂ —Propionate	655 741	C.			73
2597	BaO.2CaO.3SiO ₂	445 690	H. ?	1320 d.		338
2598	RaCl ₂	296 866	M.	1000	4 91	
				Tr. 870		
2599	RaBr ₂	385 782	M.	728	5 79	
2600	Li ₂ O	29 8780		>1700	2 013 ²⁴	
2601	LiH	7 94670	C.	680	0 820	
2602	LiOH	23 9467		450	2 54	
2603	LiOH.H ₂ O	41 9621			1 83	
2604	LiF	25 9390	C	870	2 295 ²¹	
					1. 1 780 ²⁰	
2605	LiCl	42 3970	C.	613	2 068 ²⁴	
2606	LiClO ₃	90 3970		129		
2607	LiClO ₃ .0.5H ₂ O	99 4047		65		
2608	LiClO ₄	106 397		236	2 429	
2609	LiClO ₄ .3H ₂ O	160 443	H.	95	1 841	
2610	LiBr	86 8550	C.	547	3 461 ²⁴	
2611	LiBr.2H ₂ O	122 886		44		
2612	LiBr.3H ₂ O	140 901		3 5		
2613	LiI	133 871		446	1 061 ²⁴	
					1 2 827 ⁶⁷³⁴	
2614	LiI.3H ₂ O	187 917		73		
2615	Li ₂ S	45 9430			1 66	
2616	Li ₂ SO ₄	109 943	M.	860	2 221	455
					1. 2 001 ⁸⁰⁰	
2617	Li ₂ SO ₄ .H ₂ O	127 958	M		2 06	469
2618	Li ₂ S ₂ O ₆ .2H ₂ O	210 039	R		2 158	684
2619	LiHSO ₄	104 012			2 123 ¹¹	
2620	LiNO ₂ .H ₂ O	70 9624			1 615 ⁰	
2621	LiNO ₃	68 9470	Trig.	255	1. 1 774 ⁷²	353
					2 38	
2622	LiNO ₃ .3H ₂ O	122 993		d 29 6		
2623	LiNH ₂	22 9624		390	1 178 ¹⁷	
2624	Li ₂ NH	28 8937			1 303 ¹⁹	
2625	LiBr.NH ₃	103 886		97		
2626	LiNH ₄ SO ₄	121 043	M (α) H (β) M (γ ?)		1 204	
2627	LiPO ₃	85 963			2 461	
2628	Li ₃ PO ₄	115 841	R	837	2 537 ¹⁷	
2629	Li ₃ PO ₄ .12H ₂ O	332 026	Trig.	190	1 645	
2630	LiH ₂ PO ₄	103 978		>100	2 461	
2631	Li ₃ AsO ₄	159 777			3 07	
2632	Li ₃ Sb	142 587		>950	3 21 ⁷	
2633	Li ₂ C ₂	37 8780			1 65 ¹⁸	
2634	Li ₂ CO ₃	73 8780	M.	618	2 111 ¹⁷	694
					1. 1 765 ⁰⁰⁰	
2635	Li ₂ C ₂ O ₄	101 878			2 121 ¹⁷	
2636	LiCHO ₂ .H ₂ O	69 9621	R.		1 46	
2637	LiHC ₄ H ₄ O ₆ .6H ₂ O—Malate	248 070	M			682
2638	LiC ₂ H ₃ O ₂ .2H ₂ O	101 993	R.	70		533
2639	Li ₂ (CH ₃ SO ₃) ₂ .2H ₂ O—Ethane disulfonate	238 070	M.		1 817	
2640	Li ₂ C ₁₀ H ₆ O ₈ .2H ₂ O—Naphthalene 1, 5-disulfonate	336 085	M.		1 664	814
2641	LiNH ₄ (d-C ₄ H ₄ O ₆).H ₂ O	191 024	M.			614
2642	LiNH ₄ (d-C ₄ H ₄ O ₆).H ₂ O	191 024	R.			693
2643	Li ₂ Si ₂	97 7540			1 12	
2644	Li ₂ O.SiO ₂	89 9380	R.	1201	1. 2 33 ²⁴	55
					2 52 ²⁴	322, 1042
2645	Li ₂ O.2SiO ₂	149 998		1032 d.	2 454 ²⁴	
2646	2Li ₂ O.SiO ₂	119 816		1256	2 28	1043
2647	Li ₂ SiF ₆ .2H ₂ O	191 969	M.		2 3	
2648	TiLi(d-C ₄ H ₄ O ₆).2H ₂ O	395 401	Tri.		3.144	

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Rb Rh Ru S Sb Se Sn Sr Tl Tl Tl Th Ti Tl Tl U V W Y Yb Zn Zr
 76 42 47 11 82 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 82 66 10 24 71 19 27 70 49 50 48 67 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2649	2LiI.HgI ₂ .8H ₂ O...	830.308			3.26 ⁹	
2650	2LiI.HgI ₂ .8H ₂ O...	866.339			2.95 ⁹	
2651	Li ₂ O.2MnO.P ₂ O ₅ —Lithiophilite	313.786	R.		3.5	878
2652	Li ₂ O.2FeO.P ₂ O ₅ —Triphylite	315.606	R.		3.55	895
2653	Li(UO ₂)(C ₂ H ₃ O ₂) ₂ .3H ₂ O	508.224	M.		2.280 ¹⁵	
2654	Li ₂ O.B ₂ O ₃ ...	99.5180		843		
2655	Li ₂ O.B ₂ O ₃ .16H ₂ O	387.764	Trig.	47	1.38	
2656	Li ₂ O.2B ₂ O ₃ ...	169.158		900		
2657	Li ₂ O.Al ₂ O ₃ ...	131.798		>1625	2.554 ¹⁵ 1	
2658	2LiF.Al ₂ O ₃ .P ₂ O ₅ —Amblygonite	295.846	Tri.		3.05	740
2659	Li ₂ O.Al ₂ O ₃ .28SiO ₂ —Eucriptite	251.918	H.	1388	2.67	268
2660	Li ₂ O.Al ₂ O ₃ .4SiO ₂ —Spodumene	372.038	M.	1400	3.2	854
2661	Li ₂ O.Al ₂ O ₃ .5SiO ₂ ...	432.098			2.40	
2662	Li ₂ O.Al ₂ O ₃ .6SiO ₂ ...	492.158			2.41	
2663	Li ₂ O.Al ₂ O ₃ .8SiO ₂ —Petalite	612.278	M.	1370	2.4	573
2664	2Li ₂ O.7Al ₂ O ₃ .2B ₂ O ₃ .6SiO ₂ .12H ₂ O— Manandonite.	1489.02	H.		2.89	749
2665	Na ₂ O.....	61.9940			2.27	
2666	Na ₂ O ₂ .8H ₂ O.....	222.117	H.	d. 30		
2667	NaH.....	24.0047			0.92	
2668	NaOH.....	40.0047		318.4	2.130	
2669	NaOH.3.5H ₂ O	103.059		15.5		
2670	NaF—Villiaumite	41.9970	Tet.	980	2.79	66
2671	NaCl—Halite...	58.4550	C.	804	2.163	129
2672	NaOCl.2.5H ₂ O.	119.494		57.5		
2673	NaOCl.5H ₂ O	164.532		24.5		
2674	NaClO ₃	106.455	C. Trig.	248	2.490 ¹⁶	110
2675	NaClO ₄	122.455	R.	482 d.		
2676	NaClO ₄ .H ₂ O...	140.470	H.	d. 130	2.02	
2677	NaBr.....	102.913	C.	758	3.205	
2678	NaBr.2H ₂ O.....	138.944	M.	50.7	2.176	
2679	NaBrO ₃	150.913	C.	381	3.339 ¹⁷ 8	138
2680	NaI.....	149.929	C.	651	3.667	
2681	NaIO ₃	197.929	R.	d.	4.277	
2682	NaIO ₄	213.929	Tet.	d. 300	3.865 ¹⁴	
2683	NaIO ₄ .3H ₂ O	267.975	Trig.		3.219 ¹⁸	
2684	Na ₂ S.....	78.0590			1.856	
2685	Na ₂ S ₂	110.124		445		
2686	Na ₂ S ₃	142.189		223.5		
2687	Na ₂ S ₄	174.254	C.	275		
2688	Na ₂ S ₄ .6H ₂ O....	282.346		25		
2689	Na ₂ S ₅	206.310		251.8		
2690	Na ₂ SO ₃ .7H ₂ O...	252.167	M.		1.561	
2691	Na ₂ SO ₄ (α) —Thenardite...	142.059	R.	Tr. 100	2.69	406
2692	Na ₂ SO ₄	142.059	R.	Tr. 100 to M.	2.698	
			M.	Tr. 500 to H		
			H.	884		
2693	Na ₂ SO ₄ .10H ₂ O—Glaucubers salt	322.213	M.	d. 32.4	1.464	434
2694	Na ₂ SO ₄ .10H ₂ O—Mirabilite	322.213	M.		1.48	428
2695	Na ₂ S ₂ O ₃	158.124	M.		1.667	
2696	Na ₂ S ₂ O ₃ .5H ₂ O	248.201	M.	d. 48.0	1.688	564
2697	Na ₂ S ₂ O ₃ .2H ₂ O	242.155	R.		2.189	520
2698	NaHS.3H ₂ O.	110.116	R.	22		
2699	NaHSO ₄	120.070	Tri.	>315	2.742	
2700	2Na ₂ O.NaCl.NaF.28O ₂ —Sulphohalite.	384.570	C.		2.49	76
2701	Na ₂ Se.....	362.794		—55		
2702	Na ₂ SeO ₄	189.194	R.		3.098	
2703	Na ₂ SeO ₄ .10H ₂ O....	369.348	M.		1.58	
2704	NaNO ₂	69.0050	R.	271	2.168 ⁹	
2705	NaNO ₃ —Soda-niter	85.0050	Trig.	308	2.257	288
2706	Na ₂ (NO ₂) ₂	106.010		300 d.	2.466 ³⁰	
2707	NaNH ₂	39.0204		210		
2708	3Na ₂ O.N ₂ O ₃ .28O ₂ .2H ₂ O—Darapskite	490.159	M.		2.2	475

Ag 32 Al 13 Au 33 B 34 Be 79 Br 15 C 16 Ca 44 Cl 46 Co 51 Cr 52 Cu 64 Dy 67 E 69 Eu 64 F 9 Fe 25 Gd 65 Ge 20 H 2 Hf 73 Ho 68 I 66 Ir 36 K 39 La 57 Li 30 Mn 55 Ni 58 N 7 O 8 Pb 82 Po 84 Rn 86 Rh 41 Se 34 Si 14 Sn 50 Sr 38 S 16 Ta 72 Te 52 Th 90 Ti 22 U 92 V 23 W 74 Xe 54 Y 39 Zn 30 Zr 40

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2709	6NaNO ₃ ·2Na ₂ SO ₄ ·3H ₂ O—Nitroglauberite	848 194	R.			534
2710	NaNH ₄ SO ₄ ·2H ₂ O—Lecontite	173 132	R.	d.	1 63	443
2711	NaPO ₃	102 021		616 d.	2 476	
2712	Na ₃ PO ₄	164 015		1340	2 537 ¹⁷	
2713	Na ₃ PO ₄ ·12H ₂ O	380 200	Trig.	d. 73 4	1 62	214
2714	(NaPO ₃) ₂ ·2H ₂ O	342 094	Tri.	d.	2 476	
2715	Na ₄ P ₂ O ₇ ·10H ₂ O	430 190	M.		1 832	480
2716	Na ₄ P ₂ O ₇	266 036		988	2 45	
2717	Na ₄ P ₂ O ₇ ·10H ₂ O	446 190	M.	d.	1 82	444
2718	NaH ₂ PO ₄ ·2.5H ₂ O	149 075	M.	42		432
2719	NaH ₂ PO ₄ ·H ₂ O	138 052	R.	d. 190	2 040	487
2720	NaH ₂ PO ₄ ·2H ₂ O	156 067	R.	ca. 60	1 91	450
2721	Na ₂ HPO ₄ ·5H ₂ O	216 103	R.			438
2722	Na ₂ HPO ₄ ·2H ₂ O	178 057	H.		1 848	
2723	Na ₂ HPO ₄ ·7H ₂ O	268 134	M.	d.	1 679	437
2724	Na ₂ HPO ₄ ·12H ₂ O	358 211	R. M.	34 6	1 52	433
2725	Na ₂ H ₂ P ₂ O ₇ ·6H ₂ O	314 150	M.		1 849	504
2726	Na ₂ H ₂ P ₂ O ₇	222 057	M.	d. 220	1 862	
2727	Na ₂ H ₂ P ₂ O ₇ ·6H ₂ O	330 150	M.		1 848	454
2729	Na ₂ HP ₂ O ₇ ·9H ₂ O	390 185	M.	d. 100	1 713	465
2730	Na ₂ PO ₄ ·H ₃ PO ₄ ·15H ₂ O	532 293		55		
2731	Na ₃ PO ₄ ·NaF·12H ₂ O	422 197	C.		2 216	
2732	2Na ₃ PO ₄ ·NaF·19H ₂ O	712 320	C.		2 217	74
2733	NH ₄ NaHPO ₄ ·4H ₂ O—Microcosmic salt.					
	Stercorite	209 120	M.	ca. 79 d.	1 574	436
2734	Na ₂ AsO ₄	207 951			2 835	
2735	Na ₂ AsO ₄ ·12H ₂ O	421 136	Trig.	86 3	1 759	216
2736	NaH ₂ AsO ₄ ·H ₂ O	181 988	R.		2 535	672
2737	NaH ₂ AsO ₄ ·2H ₂ O	200 003	R.		2 309	540
2738	Na ₂ HAsO ₄ ·7H ₂ O	312 070	M.		1 871	556
2739	Na ₂ HAsO ₄ ·12H ₂ O	402 147	M.	28	1 72	441
2740	2Na ₂ AsO ₄ ·NaF·19H ₂ O	800 192	C.		2 85 ²⁵	90
2741	Na ₂ AsS ₄ ·8H ₂ O	416 334	M.	d.		879
2742	2Na ₂ O·As ₂ O ₃ ·280H ₂ O	514 038			2 425 ²¹	
2743	(NH ₄)NaHAsO ₄ ·4H ₂ O	253 065	M.		1 845 ¹⁷	457
2744	NaSb	144 767		465		
2745	Na ₃ Sb	190 761		856		
2746	NaSbO ₂ ·3H ₂ O	230 813	R.	d.	2 861	
2747	Na ₃ SbS ₄ ·9H ₂ O	481 160	C.		1 839	
2748	Na ₃ Bi	277 991		775		
2749	Na ₂ C ₂	69 9940			1 575 ¹⁵	
2750	Na ₂ CO ₃	105 991		851	2 533	
2751	Na ₂ CO ₃ ·H ₂ O—Thermonatrite	124 000	R.		1 55	
2752	Na ₂ CO ₃ ·7H ₂ O	232 102	R. Trig.	d. 35 1	1 51	
2753	Na ₂ CO ₃ ·10H ₂ O—Natron	286 148	M.		1 46	431
2754	NaCHO ₂	68 0017	M.	253	1 92	
2755	NaHCO ₃	84 0047	M.		2 20	
2756	NaC ₂ H ₃ O ₂	82 0201		324	1 528	
2757	NaC ₂ H ₃ O ₂ ·3H ₂ O	136 063	M.	58; 78	1 45	452
2758	NaHC ₂ H ₂ O ₄ ·H ₂ O—Acid malonate	144 030	R.			604
2759	NaH(<i>l</i> -C ₂ H ₃ O ₄)·H ₂ O	190 051	R.			628
2760	NaC ₂ H ₃ O ₂ —Diacetate	142 051	C.			79
2761	NaC ₁₅ H ₃₁ O ₂ —Palmitate	278 236		ca. 270		
2762	NaC ₁₅ H ₃₁ O ₂ —Elaidate	304 251		227		
2763	NaC ₁₅ H ₃₁ O ₂ —Oleate	304 251		235		
2764	Na ₂ (<i>d</i> -C ₂ H ₃ O ₄)·2H ₂ O	230 056	R.		1 818	
2765	Na ₂ CO ₃ ·NaHCO ₃ ·2H ₂ O—Tronite	226 030	M.		2 147 ²¹	563
2766	Na ₃ C ₆ H ₅ O ₇ ·5H ₂ O—Citrate	348 107	R.		1 857 ²¹	
2767	NaC ₁₀ H ₈ S ₂ O ₄ ·2H ₂ O—Naphthalene 1, 5-disulfonate	345 040	M.		1 777	809
2768	Na ₂ (CH ₃ SO ₃) ₂ ·2H ₂ O—Ethane disulfonate	270 186	M.		1 939 (α)	
					1 880 (β)	
2769	NaCN	49 0050		563 7		

Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O	Os	P	Pb	Pd	Pr	Pt	Ra	Rb	Rh	Ru	S	Sa	Sb	Se	Si	Sn	Sr	Ta	Tb	Ti	Th	Tl	Tl	Tm	U	V	W	Y	Yb	Zn	Zr	
76	48	47	11	82	51	61	45	1	35	12	23	41	60	37	80	84	40	39	8	63	14	56	9	15	22	75	52	66	10	24	71	71	70	49	50	45	57	71	28	21

Index No	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2770	$\text{NaNH}_4(\text{meso-C}_6\text{H}_4\text{O}_2)\cdot\text{H}_2\text{O}$	207.082	M.		1.740	1074
2771	$\text{NaNH}_4(d\text{-C}_6\text{H}_4\text{O}_2)\cdot 4\text{H}_2\text{O}$	261.128	R.		1.587	527
2772	$\text{NaC}_5\text{H}_7\text{NO}_4$ - Glutamate	169.087	M.			574
2773	NaSCN	81.0700	R.	562.3		
2774	$\text{NaC}_6\text{H}_4(\text{NH}_2)\text{SO}_3\cdot 2\text{H}_2\text{O}$ - Sulfanilate	231.147	R.			696
2775	$\text{NaC}_{10}\text{H}_6\text{NO}_8\cdot 4\text{H}_2\text{O}$ - 1, 4-Naphthylamine sulfonate	317.193	M.			747
2776	$\text{Na}_2\text{O}\cdot\text{SiO}_2$	122.054		1088		1040
2777	$\text{Na}_2\text{O}\cdot 2\text{SiO}_2$	182.114	R.	874		571
2778	Na_2SiF_6	188.054	H.		2.679	202
2779	$\text{Na}_2\text{O}\cdot 3\text{TiO}_2$	301.694	M.		3.518	
2780	$\text{Na}_2\text{O}\cdot\text{ZrO}_2\cdot 6\text{SiO}_2\cdot 3\text{H}_2\text{O}$ - Elpidite	599.400	R.		2.58	689
2781	$\text{Na}_2\text{O}\cdot\text{Ph}(\text{OH})(\text{ClSO}_3)\text{-Carneolite}$	401.725	R.		4.5	937
2782	$\text{TiNa}(d\text{-C}_6\text{H}_4\text{O}_2)\cdot 2\text{H}_2\text{O}$	411.459	Tri.		3.289	
2783	$\text{TiNa}(\text{meso-C}_6\text{H}_4\text{O}_2)\cdot 2.5\text{H}_2\text{O}$	420.460	Tri.		3.120	
2784	$\text{TiNa}(d\text{-C}_6\text{H}_4\text{O}_2)\cdot 4\text{H}_2\text{O}$	447.489	R.		2.580	
2785	$\text{NaTi}_3(d\text{-C}_6\text{H}_4\text{O}_2)_2$	932.259	R.		4.145	
2786	ZnNaPO_4	183.401	R.		3.3	
2787	$\text{Zn}(\text{Na}_2\text{PO}_4)_2$	347.416	C.		2.8	
2788	$\text{Na}_2\text{SO}_4\cdot\text{CdSO}_4$	350.534		551		
2789	$\text{Na}_2\text{SO}_4\cdot\text{CuSO}_4\cdot 2\text{H}_2\text{O}$ - Krochinkite	337.725	M.		2.061	715
2790	$\text{Na}_2\text{SO}_4\cdot\text{Cu}(\text{OH})_2\cdot 3\text{CuSO}_4\cdot 3\text{H}_2\text{O}$ - Natrochalcite	772.596	M.	d. 350	2.33	840
2791	$\text{NaCu}(\text{CN})_3$	138.583		d. 100	1.013	
2792	$\text{Na}_3\text{IrCl}_6\cdot 12\text{H}_2\text{O}$	691.024		50		
2793	$\text{Na}_3\text{PtCl}_6\cdot 4\text{H}_2\text{O}$	455.118		100 d.		
2794	$\text{Na}_3\text{PtCl}_6\cdot 6\text{H}_2\text{O}$	562.064	Tri.		2.50	
2795	$\text{Na}_3\text{PtBr}_6\cdot 6\text{H}_2\text{O}$	828.812	Tri.		3.323	
2796	$\text{Na}_3\text{PtI}_6\cdot 6\text{H}_2\text{O}$	1110.91	M. ?		3.707	
2798	$\text{Na}_2\text{Ru}(\text{NO}_2)_2\cdot 2\text{H}_2\text{O}$	413.765	M.			741
2799	$\text{Na}_3\text{MnP}_2\text{O}_7$	271.972			2.9	
2800	$\text{Na}_2\text{O}\cdot 2\text{MnO}\cdot\text{P}_2\text{O}_5$ - Natrophilite	345.902	R.		3.41	871
2801	$\text{Na}_4\text{Mn}(\text{PO}_4)_2$	336.966			2.7	
2802	$\text{Na}_2\text{O}\cdot 3\text{Fe}_2\text{O}_3\cdot 4\text{SO}_3\cdot 6\text{H}_2\text{O}$ - Natrojarosite	969.380	R.		3.2	966
2803	$2\text{Na}_2\text{O}\cdot\text{Fe}_2\text{O}_3\cdot 4\text{SO}_3\cdot 7\text{H}_2\text{O}$ - Sideronatrite	684.042	R.		2.2	725
2804	$3\text{Na}_2\text{SO}_4\cdot\text{Fe}_2(\text{SO}_4)_3\cdot 6\text{H}_2\text{O}$ - Ferrinatrite	934.144	Trig.		2.55	271
2805	$\text{Na}_4\text{Fe}_3(\text{C}_2\text{O}_4)_6\cdot 10\text{H}_2\text{O}$	957.816	M.		1.97317	
2806	$\text{Na}_3\text{Fe}(\text{CN})_6\cdot \text{XO}\cdot 2\text{H}_2\text{O}$	297.913	R.		1.72	
2807	$\text{Na}_3\text{Fe}(\text{CN})_6\cdot 12\text{H}_2\text{O}$	520.061	M.		1.158	616
2808	$\text{Na}_2\text{O}\cdot\text{Fe}_2\text{O}_3\cdot 4\text{SiO}_2$ - Aegirite	461.914	M.		3.5	956
2809	$\text{Na}_2\text{O}\cdot\text{Fe}_2\text{O}_3\cdot\text{FeO}\cdot 5\text{SiO}_2$ - Riebeckite	593.814	M.		3.44	887
2810	$\text{Na}_2\text{O}\cdot 2\text{FeO}\cdot\text{Fe}_2\text{O}_3\cdot 6\text{SiO}_2$ - Crocidolite	725.711	M.		3.2	893
2811	Na_3CrO_4	162.004	R.	392	2.723	
2812	$\text{Na}_2\text{CrO}_4\cdot 4\text{H}_2\text{O}$	234.066	M.	d. 64 s		
2813	$\text{Na}_2\text{CrO}_4\cdot 6\text{H}_2\text{O}$	270.096	Tri.	d. 25.9		
2814	$\text{Na}_2\text{CrO}_4\cdot 10\text{H}_2\text{O}$	342.158	M.		1.483	
2815	$\text{Na}_2\text{Cr}_2\text{O}_7\cdot 2\text{H}_2\text{O}$	298.045	M.	320	2.5211	892
2816	$\text{Na}_2\text{O}\cdot 2\text{CrO}_3\cdot \text{Li}_2\text{O}\cdot 2\text{H}_2\text{O}$	631.909			3.21	
2817	$\text{Na}_2\text{Cr}_2\text{S}_4$	278.274	H.	d.	2.5512	
2818	$\text{NH}_4\text{NaCrO}_4\cdot 2\text{H}_2\text{O}$	193.077	R.	d.	1.84219	
2819	NaCrP_2O_7	249.055	R.		3	
2820	Na_2MoO_4	205.994		687	1.2.5901026	
2821	$\text{Na}_2\text{Mo}_2\text{O}_7$	349.994		612		
2822	$3\text{Na}_2\text{O}\cdot 0.7\text{MoO}_3\cdot 22\text{H}_2\text{O}$	1590.32	M.	ca 700		
2823	$3\text{Na}_2\text{O}\cdot 0.5\text{MoO}_3\cdot \text{P}_2\text{O}_5\cdot 14\text{H}_2\text{O}$	1300.25	R.			818
2824	Na_2WO_4	293.994	R.	698	4.179	
2825	$\text{Na}_2\text{WO}_4\cdot 2\text{H}_2\text{O}$	330.025	R.		1.3.613296	
2826	$\text{Na}_2\text{W}_2\text{O}_6$	509.994			3.245	
2827	$\text{Na}_2\text{W}_3\text{O}_{10}$	741.994		d.	7.28	
2828	$\text{Na}_2\text{W}_4\text{O}_{12}$	973.994			6.617	
2829	$\text{Na}_2\text{O}\cdot 0.4\text{WO}_3\cdot 10\text{H}_2\text{O}$	1170.15	C.	706.6	7.1954	
2830	$\text{Na}_2\text{W}_5\text{O}_{15}$	1205.99			3.84713	
					7.28317	

Ag	Al	As	Au	B				Ba	Be	Bi	Br	C				Ca	Cl	Cd	Ce	Co				Cr	Cu	Dy				Er	Eu	F	Fe	Ga				Gd	Ge	Gl	H	Hf	Hg	Ho	I	In	Ir				K	La	Li	Lu	
33	65	13	33	54				79	75	13	5	16				77	81	29	59	44				46	85	31	67				69	64	3	43	25				65	20	75	2	73	30	83	6	26	36				83	58	81	72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2831	4Na ₂ O.10WO ₃ .23H ₂ O	2982 33	M.	680.8	4 3	
2832	5Na ₂ O.12WO ₃ .28H ₂ O	3598 40	Tri.	705.8		
2833	9Na ₂ O.22WO ₃ .51H ₂ O	6580 73		683.3		
2834	Na ₂ O.3UO ₃	920 504	R ?		6 912	
2835	NaU(C ₂ H ₃ O ₇) ₂	438 236	Tet.		2 56	109.1
2836	NaVO ₃	121 957	M "	562	2 79	
2837	Na ₂ O.V ₂ O ₅ .5V ₂ O ₅	1137 51	R "	ca 800 d.		
2838	Na ₂ VO ₄	183 951		ca. 866		
2839	Na ₂ VO ₄ .10H ₂ O	364 105	C II			127, 263
2840	Na ₂ VO ₄ .12H ₂ O	400 136	Trig			245
2841	Na ₂ V ₂ O ₇	305 908	II	654		
2842	2Na ₂ VO ₄ .NaF.19H ₂ O	752.192	C			123
2843	Na ₂ VSO ₃ .10H ₂ O	380 170		18	1 773	
2844	3Na ₂ O.V ₂ O ₅ .10WO ₃ .SiO ₂ .29H ₂ O	3270 41	C.		3 344	
2845	Na ₂ CbO ₃	187.094			1 19	
2846	Na ₂ O B ₂ O ₃	131 634		966		
2847	Na ₂ O 2B ₂ O ₃	201 274		741	1 2 5 glass	45
					2 37	
2848	Na ₂ B ₄ O ₇ .10H ₂ O - Borax	381 428	M.	75	1 73	460
2849	Na ₂ O.4B ₂ O ₃	340 554		783		
2850	NaAlO ₂	81 9570		1650		
2851	2NaF.AlF ₃ —Chiolite	167 954	Tet.		3 0	205
2852	3NaF.AlF ₃ —Cryolyte	209 950	M	1000	2 90	427
					1. 2. 10 ¹⁰⁰⁰	
2853	Na ₂ O. Al ₂ O ₃ .4SO ₃ .12H ₂ O -Tamarugite	700 359	M. Tri.		2.03	494
2854	Na ₂ O Al ₂ O ₃ .4SO ₃ .22H ₂ O -Mendozite	880 513	M. ?		1 88	440
2855	Na ₂ SO ₄ .Al ₂ (SO ₄) ₃ .24H ₂ O	916 544	C.	61	1 675	72
2856	Na ₂ O.3Al ₂ O ₃ .4SO ₃ .6H ₂ O—Natrosalunite	796 106	Trig. C.		2 6	287
2857	Na ₂ O. Al ₂ O ₃ .P ₂ O ₅ .H ₂ O—Fremontite	323 977	M ?		3 04	760
2858	Na ₂ O.2AlF ₃ .As ₂ O ₃ —Durangite	396 834	M		1 0	806
2859	Na ₂ O. Al ₂ O ₃ .2CO ₂ .2H ₂ O—Dawsonite	287 944	R		2 4	653
2860	Na ₂ O. Al ₂ O ₃ .2SiO ₂ —Carnegieite	284 034	Tri. ?	1526	2 57	596
2861	Na ₂ O. Al ₂ O ₃ .2SiO ₂ —Nephelite	284 034	II	Tr 1248	2 67	266
2862	Na ₂ O. Al ₂ O ₃ .3SiO ₂ .2H ₂ O—Natrolite	380 125	R		2 25	478
2863	Na ₂ O. Al ₂ O ₃ .4SiO ₂ —Jadeite	404 154	M	1050	3 34	834
2864	Na ₂ O. Al ₂ O ₃ .4SiO ₂ .2H ₂ O—Analcite	440 185	C.		2 25	220
2865	Na ₂ O. Al ₂ O ₃ .6SiO ₂ —Albite	524 274	Tri	1100	2 61	615
2866	Na ₂ O. Al ₂ O ₃ .9SiO ₂ .2NaF—Leifite	788 448	II.		2 57	248
2867	Na ₂ O.3Al ₂ O ₃ .6SiO ₂ .2H ₂ O—Paragonite	764 145	M		2 8	750
2868	2Na ₂ O. Al ₂ O ₃ .6SiO ₂ .H ₂ O—Ussingite	604 283	Tri.		2 50	565
2869	2Na ₂ O.3Al ₂ O ₃ .6SiO ₂ .7H ₂ O—Hydronephelie	946 246	II		2 3	236
2870	3Na ₂ O.3Al ₂ O ₃ .6SiO ₂ .2NaCl—Sodalite	969 012	C.		2 2	99
2871	3Na ₂ O.3Al ₂ O ₃ .18SiO ₂ .2NaCl—Marialite	1689 73	Tet.		2 56	261
2872	3Na ₂ O ₃ .3Al ₂ O ₃ .6SiO ₂ .2Na ₂ S—Lazurite	1008 22	C.		2 4	108
2873	5Na ₂ O.3Al ₂ O ₃ .6SiO ₂ .2SO ₃ —Noselite	1136 22	C.		2 3	105
2874	Na ₂ La(NO ₃) ₅ .H ₂ O	512 959	M		2 63 ⁴	
2875	Na ₂ Ce(NO ₃) ₅ .H ₂ O	514 299			2 65 ⁴	
2876	Na ₂ O 2BeO P ₂ O ₅ —Beryllomite	251 082	R.		2 85	679
2877	Na ₂ O.2BeO 6SiO ₂ .H ₂ O—Epididymite	490 409	R		3 55	700
2878	Na ₂ O.2BeO.6SiO ₂ .H ₂ O—Epididymite	490 409	M.		2 55	657
2879	Na ₂ SO ₄ MgSO ₄	262 444	R.		2 729	
2880	Na ₂ O.MgO 2SO ₃ .2.5H ₂ O—Loewite	307 483	Trig.	Tr. 71	2 37	232
2881	Na ₂ O MgO 2SO ₃ .4H ₂ O—Bloedite	334 506	M.		2 23	498
2882	3Na ₂ O MgO.4SO ₃ —Vanthoffite	546 562	M. ?		2 69	497
2883	NaMgPO ₄	142 341			2 5	
2884	Na ₂ MgP ₂ O ₇	244 362	C. ?		2 2	
2885	Na ₂ Mg(CO ₃) ₂	190 314	Tet.		2 729 ¹⁵	
2886	NaCl Na ₂ CO ₃ .MgCO ₃ —Northrupite	248 769	C.		2 377 ¹⁵	118
2887	3Na ₂ O.2MgO 4CO ₂ SO ₃ —Tychite	522 687	C.		2 52	113
2889	Na ₂ O.CaO.2SO ₃ —Glauberite	278 194	M.		2 83	625
2890	Na ₂ O.CaO.2SO ₃ .4H ₂ O—Wattevillite	350 257	M.		1 81	446
2891	3Na ₂ O.3CaO.2P ₂ O ₅	638 288	M.		2 1	

Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O	P	Pb	Pd	Pr	Pt	Ra	Rb	Rh	Ru	S	Sa	Sb	Se	Si	Sn	Sr	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr		
76	42	47	11	82	51	61	45	1	35	12	23	41	80	37	80	84	40	39	8	63	14	56	9	18	22	78	52	66	10	24	19	27	70	49	50	68	57	71	28	21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.																								
2893	$\text{Na}_2\text{O} \cdot \text{CaO} \cdot 2\text{CO}_2 \cdot 2\text{H}_2\text{O}$ —Pirssonite	242.095	R.	813	2.35	567																								
2894	$\text{Na}_2\text{O} \cdot \text{CaO} \cdot 2\text{CO}_2 \cdot 5\text{H}_2\text{O}$ —Gaylussite	296.141	M.		1.94	580																								
2895	$\text{Na}_2\text{O} \cdot 4\text{CaO} \cdot 6\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Peetolite	664.650	M.		2.73	766																								
2896	$\text{Na}_2\text{O} \cdot 2\text{CaO} \cdot 5\text{B}_2\text{O}_3 \cdot 16\text{H}_2\text{O}$ —Ulexite	810.580	M.	d.	1.95	551																								
2897	$\text{NaF} \cdot \text{CaF}_2 \cdot \text{AlF}_3 \cdot \text{H}_2\text{O}$ —Pachnolite	222.042	M.		2.98	429																								
2898	$\text{NaF} \cdot \text{CaF}_2 \cdot \text{AlF}_3 \cdot \text{H}_2\text{O}$ —Thomsonolite	222.042	M.		2.98	430																								
2899	$\text{Na}_2\text{O} \cdot \text{CaO} \cdot 2\text{Al}_2\text{O}_3 \cdot 10\text{SiO}_2 \cdot 20\text{H}_2\text{O}$ Faujasite	1282.81	C.		1.92	92																								
2900	$\text{Na}_2\text{O} \cdot 2\text{CaO} \cdot 3\text{Al}_2\text{O}_3 \cdot 9\text{SiO}_2 \cdot 8\text{H}_2\text{O}$ Mesolite	1164.56	Tri.		2.27	555																								
2901	$\text{Na}_2\text{O} \cdot 2\text{CaO} \cdot 3\text{Al}_2\text{O}_3 \cdot 9\text{SiO}_2 \cdot 8\text{H}_2\text{O}$ Pseudomesolite	1164.56	Tri.		2.22	531																								
2902	$5(\text{Na}_2\text{O} \cdot \text{CaO}) \cdot 3\text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot 2\text{SO}_3$ Hedleyite		C.		2.4	106																								
2903	$\text{NaF} \cdot \text{CaO} \cdot \text{BeO} \cdot 2\text{SiO}_2$ —Leucophanite	243.207	R.		2.96	743																								
2904	$\text{NaF} \cdot 2\text{CaO} \cdot 2\text{BeO} \cdot 3\text{SiO}_2$ —Meliphanite	384.357	Tet.		3.01	297																								
2905	$\text{NaCaMgAlSi}_4\text{O}_{12}$ —Tuxtlite	418.587	M.		3.27	870																								
2906	$\text{Na}_2\text{SrSiO}_7$	277.679		280																										
2907	$\text{Na}_2\text{Sr}(\text{CO}_3)_4$	253.614		750																										
2908	$\text{Na}_4\text{SrCa}(\text{CO}_3)_4$	459.678		720																										
2909	$\text{Na}_4\text{Ba}(\text{CO}_3)_4$	303.364		740																										
2910	$2\text{Na}_2\text{O} \cdot \text{BaO} \cdot 2\text{TiO}_2 \cdot 10\text{SiO}_2$ — Leucospheutite	1037.76	M.		3.1	849																								
2911	$\text{Na}_4\text{BaCa}(\text{CO}_3)_4$	509.428		660																										
2912	$\text{NaLi}(\text{d}-\text{C}_4\text{H}_4\text{O}_4) \cdot 2\text{H}_2\text{O}$	213.998	M.			506																								
2913	$3\text{NaF} \cdot 3\text{LiF} \cdot 2\text{AlF}_3$ —Cryolithionite	371.728	C.		2.78	67																								
2914	K_2O	94.1900			2.32																									
2915	K_2O_4	142.190		>280																										
2916	KH	40.1027		d.	0.80																									
2917	KOH	56.1027		Tr. 260	2.044																									
2918	KF	58.0950		380	1.1 874 ¹⁰																									
				880	2.48																									
					1.1 869 ¹²																									
2919	KF·2HF	98.1104		105																										
2920	KF·3HF	118.118		100																										
2921	KCl—Sylvite	74.5530	C.		1.988	103																								
2922	KClO ₄	122.553	M.	368.4	2.32	579																								
2923	KClO ₃	138.553	R.	d. 400	2.52																									
2924	KBr	119.011		730	2.75	134																								
2925	KBrO ₄	167.011	Trig.	370 d.	3.27 ¹⁷																									
2926	KI	166.027	C.	773	3.123	150																								
2927	KI ₃	119.891	M.	45	3.498																									
2928	KIO ₃	214.027	M.	560	3.89																									
2929	KIO ₄	230.027	Tet.	582	3.618																									
2930	$\text{K}_2\text{H}_2\text{IO}_6 \cdot 3\text{H}_2\text{O}$	358.191	Tri.			541																								
2931	KICl ₄	236.943	M.	60																										
2932	KIBr ₃	325.859	R.	60																										
2933	K ₂ S	110.255		471	1.805																									
				Tr. 146.4																										
2934	$\text{K}_2\text{S} \cdot 5\text{H}_2\text{O}$	200.332		60																										
2935	K ₂ S ₂	174.385		252.0																										
2936	K ₂ S ₄	206.450		>145																										
2937	K ₂ S ₅	238.515		206.0																										
2938	K_2SO_4 —Arcanite	174.255	R.	Tr. 588	2.662	519																								
				1067																										
2939	K ₂ S ₂ O ₈	190.320	C.	d. 400																										
2940	$\text{K}_2\text{S}_2\text{O}_8 \cdot 0.33\text{H}_2\text{O}$	196.325	M.		2.23																									
2941	K ₂ S ₂ O ₆	238.320	Trig.		2.278	215																								
2942	K ₂ S ₂ O ₇	254.320		>300	2.277																									
2943	K ₂ S ₂ O ₈	270.320	Tri.			458																								
2944	K ₂ S ₂ O ₄	270.385	R.		2.304	472																								
2945	K ₂ S ₂ O ₃	302.450	M.		2.296																									
2946	$\text{K}_2\text{S}_2\text{O}_8 \cdot 1.5\text{H}_2\text{O}$	361.538			2.112																									
Ag 37	Al 13	Au 79	B 81	Ba 56	Be 4	Bi 83	Br 35	C 12	Ca 20	Cl 17	Ce 58	Co 27	Cu 29	Cr 24	Dy 64	Er 68	F 9	Fe 26	Ga 31	Ge 32	H 1	Hf 72	Hg 80	I 53	In 51	Ir 77	K 19	La 57	Li 3	Lu 71

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2947	KSH.....	72 1677		455		
2948	KHSO ₄ —Misenite.....	136 168	R. M.	210	2 35	
2949	KHSO ₄	216 233		168		
2950	K ₂ SO ₄ .KHSO ₄	310 423	M.		2 59 ¹⁸	508
2951	4K ₂ SO ₄ .3H ₂ SO ₄	991 261		d. <25	2 277 ¹⁸	
2952	KSO ₃ F.....	138 160		311		
2953	KI.4SO ₃	422 287		0 26		
2954	K ₂ Se.....	157 390			2 851	
2955	K ₂ SeO ₄	221 390	R.		3 000	646
2956	K ₂ SeSO ₇	301 455		120		
2957	K ₂ H ₂ TeI ₂ O ₁₀ .2H ₂ O.....	657 600	Trig.			307
2958	KNO ₃	85 1030		297	1 915	
2959	KNO ₃ —Niter.....	101 103	R. Trig.	Tr. 129 R. to Trig	2 11 ¹⁰ 4	556
				333		
2960	KNH ₂	55 1184		338		
2961	KNO ₃ .2HNO ₃	227 131		22		
2962	KBr.4NH ₃	187 135		45		
2963	KNO ₃ .KHSO ₄	237 271			2 38	
2964	5K ₂ O.(NH ₄) ₂ O.6SO ₃ —Taylorite.....	1003 42				440
2965	KPO ₃	118 119		Tr. 450	2 258 ¹⁴ 4	
				810	1 2 008 ²⁰⁰⁰	
2966	K ₃ PO ₄	212 309		1340		
2967	K ₄ P ₂ O ₇	330 428		Tr. 278	2 33	
				1090		
2968	KH ₂ PO ₄	136 134	Tet.	96	2 338	244
2969	K ₂ H ₂ P ₂ O ₆ .2H ₂ O.....	274 284	M.	d.		624
2970	K ₂ H ₂ P ₂ O ₆ .3H ₂ O.....	292 300	R.	d.		483
2971	KH ₂ AsO ₄	180 070	Tet.	288	2 867	278
2972	5K ₂ O.As ₂ O ₃ .8SO ₃ .6H ₂ O.....	1449 48			2 289	
2973	KSb.....	160 865		605		
2974	K ₃ Sb.....	239 055		812		
2975	K ₂ CO ₃	138 190		891	2 29	
2976	(KCO ₃) ₂	134 190		78		
2977	K ₂ C ₂ O ₄ .H ₂ O.....	184 205	M.		2 13	486
2978	K ₂ O.2CO ₂ .H ₂ O—Kalicinite.....	200 205	M.	d. <200	2 17	476
2979	2K ₂ CO ₃ .3H ₂ O.....	330 426	M.		2 043	
2980	KCHO ₂	84 1027		167 5	1 91	
2981	KHC ₂ O ₄	128 103	M.		2 0	655
2982	KHC ₂ O ₄ .H ₂ O.....	146 118			2 044	
2983	KC ₂ H ₃ O ₂	98 1181		292	1 8	
2984	KC ₂ H ₃ O ₂ —Acid succinate.....	156 134	M.	242 d.	1 767	
2985	KC ₂ H ₃ O ₂ .2H ₂ O—Acid succinate.....	192 164	R.		1 616	617
2986	KH(dl-C ₄ H ₄ O ₆).....	188 134	R.		1 956	
2987	KH(dl-C ₄ H ₄ O ₆).....	188 134	M.		1 954	
2988	KH(C ₂ H ₃ O ₂) ₂	158 149		142		
2989	KC ₂ H ₃ O ₂ —Citrate.....	230 149	Tri.		1 906	
2990	KC ₂ H ₃ O ₂ .2C ₂ H ₄ O ₂	218 180		112	1 47	
2991	KHC ₈ H ₄ O ₄ —Acid phthalate.....	204 131	R.		1 630	
2992	KH(C ₂ H ₃ O ₂) ₂ —Disuccinate.....	274 180	M.	162	1 56	
2993	KC ₂ H ₃ O ₂ .2H ₂ O—Acetylsalicylate.....	254 180		65		1037
2994	KC ₁₈ H ₁₃ O ₂ —Oleate.....	320 349				
2995	K ₂ C ₄ H ₄ O ₄ .3H ₂ O—Succinate.....	248 267	R.		1 564	
2996	K ₂ (d, l-C ₄ H ₄ O ₆).....	226 221	M.		1 984	
2997	K ₂ (d, l-C ₄ H ₄ O ₆).0.5H ₂ O.....	235 229	M.		1 98	610
2998	2K ₂ C ₂ O ₄ .H ₂ C ₂ O ₄ .2H ₂ O—Tetraoxalate.....	458 426	R.		1 213 ²²	592
2999	KH(CCl ₃ CO ₂) ₂	364 851	Tet.		2 005 ¹⁸	
3000	KC ₂ H ₃ O ₂ S—Ethyl sulfate.....	164 199	M.		1 843	
3001	KC ₂ H ₃ O ₂ S—p-Phenolsulfonate.....	212 199	R.	>260	1 87	770
3002	KC ₂ H ₃ O ₂ S.2H ₂ O—o-Phenolsulfonate.....	248 229	R.		1 734	697
3003	KC ₂ H ₃ O ₂ S ₂ .H ₂ O—2, 4-Phenoldisulfonate.....	309 271	R.			768
3004	CH ₃ (SO ₂ K) ₂ —Methane disulfonate.....	252 335	M.		2 376	645
3005	K ₂ C ₁₀ H ₆ O ₈ .2H ₂ O—Naphthalene 1, 5-disulfonate.....	336 397	M.		1 707	850

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Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
3006	KCN	65 1030		634.5	1.52 ¹⁸	
3007	KCNO	81 1030			2.048	
3008	$\text{KNH}_4(d\text{-C}_4\text{H}_4\text{O}_4) \cdot 0.5\text{H}_2\text{O}$	214 172			1.700	
3009	$\text{KC}_4\text{H}_2\text{N}_4\text{O}_4$ - Acid oxosulphate	253 142				1038
3010	$\text{KC}_4\text{H}_2\text{O}_5\text{N}_4$ - Persulfate	267 134	R		1.852	982
3011	KCNS	97 1680		173.2	1.886	
3012	$\text{K}(\text{ShO})(d\text{-C}_4\text{H}_4\text{O}_4) \cdot 0.5\text{H}_2\text{O}$ - Tartar emetic	333 904	R.		2.607	810
3013	$\text{K}_2\text{O} \cdot \text{SiO}_2$	154 250		976		
3014	$\text{K}_2\text{O} \cdot 2\text{SiO}_2$	214 310	R ?	1041		532
3015	$\text{K}_2\text{O} \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$	352 445	R.	d. 100	2.417	634
3016	K_2SiF_6 - Herapatite	220 250	C.		2.665	
3017	$\text{K}_2\text{Ti}_2\text{O}_7$	253 990		980		
3017.5	K_2ZrF_6	283 190	M.			1037.2
3017.6	K_2ZrF_7	341 285	C.			68.2
3018	$\text{K}_2\text{Sn}(\text{OH})_6$	298 936	Trig.		3.197	
3019	K_2SnCl_6	409 638	C.		2.71	147
3020	K_2SnBr_6	676 386			3.783	
3021	$\text{K}_2\text{SnS}_4 \cdot 3\text{H}_2\text{O}$	347 131			1.847 ¹⁸	
3022	$\text{K}_2\text{Pb}_2\text{Cl}_7$	630 785	R.	440		
3023	K_2PbCl_6	498 138	C.	d. 190		
3024	$\text{KC}_4\text{H}_4\text{O}_4 \cdot \text{PbI}(\text{C}_4\text{H}_4\text{O}_4)$	491 273		208.5		
3025	$\text{K}_2\text{Ga}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	517 130	C.		1.895	86
3026	$\text{K}_2\text{InCl}_6 \cdot 2\text{H}_2\text{O}$	480 864	Tet.		2.483	
3027	$\text{K}_2\text{InBr}_6 \cdot 2\text{H}_2\text{O}$	747 612	Tet.		3.140	
3028	$\text{K}_2\text{TiCl}_6 \cdot 2\text{H}_2\text{O}$	570 464	Tet.		2.859	
3029	$\text{K}_2\text{SO}_4 \cdot \text{ZnSO}_4 \cdot 6\text{H}_2\text{O}$	443 792	M.	d. 121	2.245	482
3030	$\text{K}_2\text{Zn}(\text{SeO}_4)_2 \cdot 2\text{H}_2\text{O}$	466 001	Tri.		3.21	
3031	$\text{K}_2\text{Zn}(\text{SeO}_4)_2 \cdot 6\text{H}_2\text{O}$	538 062	M.		2.554	588
3032	$\text{K}_2\text{Zn}(\text{CN})_4$	247 602	C.	d. 150		70
3033	$4\text{KCl} \cdot \text{CdCl}_2$	481 538	Trig.		2.5	293
3034	$\text{K}_2\text{Cd}(\text{NO}_3)_4$	371 632	R.			691
3035	CdKPO_4	246 529	R.		3.8	
3036	$\text{KCl} \cdot 2\text{HgCl}_2 \cdot 2\text{H}_2\text{O}$	653 636	R		4.11 ¹⁸	
3037	$2\text{KCl} \cdot \text{HgCl}_2 \cdot \text{H}_2\text{O}$	438 617	R		3.58 ¹⁸	877
3038	$\text{KBr} \cdot \text{HgBr}_2$	479 453			4.40	
3039	$\text{KBr} \cdot \text{HgBr}_2 \cdot \text{H}_2\text{O}$	497 468			3.865	
3040	$\text{KI} \cdot \text{HgI}_2 \cdot \text{H}_2\text{O}$	638 516		104		
3041	$2\text{KCN} \cdot \text{Hg}(\text{CN})_2$	382 832	Tet.		2.447 ^{21.3}	
3042	$2\text{KCl} \cdot \text{CuCl}_2 \cdot 2\text{H}_2\text{O}$	319 623	Tet.		2.41	312
3043	$\text{K}_2\text{O} \cdot \text{CuO} \cdot 2\text{SO}_3 \cdot 6\text{H}_2\text{O}$ - Cyanochrome	441 982	M.		2.22	491
3045	$\text{K}_2\text{SeO}_4 \cdot \text{CuSeO}_4 \cdot 6\text{H}_2\text{O}$	536 252	M.		2.527	603
3046	$\text{K}_2\text{CO}_3 \cdot \text{CuCO}_3$	261 760			1.35 ⁶⁹	
3047	$\text{K}_2\text{Cu}(\text{CN})_4$	281 887	Trig.			121
3048	$\text{KNO}_3 \cdot \text{AgNO}_3$	270 991	M.	125	3.219	
3049	$2\text{KNO}_3 \cdot \text{AgNO}_3 \cdot \text{Bi}(\text{NO}_3)_3$	671 118			3.33	
3050	KAgCO_3	206 975		d.	3.769	
3051	KAuCl_4	378 127	M.	357		
3052	$\text{K}_2\text{Os}(\text{CN})_6 \cdot 3\text{H}_2\text{O}$	557 274	M.			769
3053	K_2IrCl_6	484 038	C.	d.	3.546	
3054	$\text{K}_2\text{SO}_4 \cdot \text{Ir}_2(\text{SO}_4)_3 \cdot 2\text{H}_2\text{O}$	1281 02	C.	103		
3055	$\text{K}_2\text{Ir}(\text{C}_2\text{O}_4)_3 \cdot \text{H}_2\text{O}$	646 417	Tri.		2.510 ¹⁹	
3056	$\text{K}_2\text{IrCl}_2(\text{C}_2\text{O}_4)_2 \cdot \text{H}_2\text{O}$ - Chloroxalate	615 316	M.			736
3057	$\text{K}_2\text{IrCl}_2(\text{NO}_2)_2(\text{C}_2\text{O}_4) \cdot 2\text{H}_2\text{O}$ - Dichloro dinitro oxalate	597 348	R.			716
3058	K_2PtCl_6	415 252	Tet.		3.30	
3059	K_2PtCl_6	486 168	C.	d. 250	3.499	
3060	K_2PtBr_6	752 916	C.	> 400 d.	4.66	
3061	K_2PtI_6	1035.01	C.		5.18	
3062	$\text{K}_2\text{S} \cdot 3\text{PtS} \cdot \text{PtS}_2$	1051 50		d.	6.44 ¹⁵	
3063	$[\text{Pt}(\text{NH}_3)(\text{Cl})\text{K} \cdot \text{H}_2\text{O}]$	375 746	R.			709
3064	$\text{K}_2\text{Pt}(\text{NO}_2)_2\text{Br}_2 \cdot \text{H}_2\text{O}$	543 283	Tri.			858
3065	$\text{K}_2\text{Pt}(\text{NO}_2)_2 \cdot 2\text{H}_2\text{O}$	655 331	Tet.			362

Ag 52 Al 53 Au 33 B 54 Ba 55 Be 56 Br 57 C 58 Ca 59 Cl 60 Co 61 Cr 62 Cu 63 Dy 64 E 65 F 66 Fe 67 Ga 68 Ge 69 Gd 70 H 71 In 72 Ir 73 K 74 La 75 Li 76 Lu 77 Mn 78 Mo 79 Ni 80 Pb 81 Pt 82 Rb 83 Rh 84 Sb 85 Se 86 Sn 87 Sr 88 Ta 89 Te 90 Th 91 Ti 92 U 93 V 94 W 95 Zn 96 Zr 97

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
3066	$K_2Pt(C_2O_4)_2 \cdot 2H_2O$	485.451	M.		3.03	
3067	$K_2Pt(CN)_6$	377.452	R.		2.45	
3068	$K_2Pt(NO_3)_2 \cdot C_2O_4 \cdot H_2O$	471.451	M.			817
3069	$K_2Pt(SCN)_6$	621.858	H.		3.70 ¹⁹	
3070	$K_2Pt(SCN)_6 \cdot 2H_2O$	657.880	M. R.		2.342 ¹⁸	
3071	$K_2Pt(SeCN)_6$	904.668	R.	d. 80	3.378 ^{12, 13}	
3072	$K_2RuO_4 \cdot H_2O$	222.810	Tet.	d. 400 ^{14, 15}		
3073	$K_4Ru(CN)_6 \cdot 3H_2O$	468.174	M.			722
3074	$K_3Rh(CN)_6$	376.243	M.			669
3075	K_2PdCl_4	326.722			2.07	
3076	K_2PdCl_4	397.638	C.		2.738	
3077	$KMnO_4$	158.025	R.	d. <240	2.703	291
3078	$K_2MnCl_4 \cdot 2H_2O$	310.983	Tri.		2.221	
3079	K_2MnCl_4 —Chloromanganokalite	424.058	Trig.		2.31	
3080	$K_2SO_4 \cdot MnSeO_4 \cdot 2H_2O$	408.416	Tri.		3.07	
3081	$K_4Mn(CN)_6$	328.695	M.			1055
3082	$K_2Fe(SO_4)_2$	326.160			2.177	
3083	$K_2Fe(SO_4)_2 \cdot 6H_2O$	434.252	M.		2.109	179
3084	$K_2Fe_2(SO_4)_3 \cdot 24H_2O$	1006.50	C.	33	1.831	97
3085	$K_2O \cdot 3Fe_2O_3 \cdot 48H_2O$ —Jarosite	1001.58	R.		3.2	370
3086	$K_4Fe_2(CrO_4)_3 \cdot 6H_2O$	806.342	M.		1.448 ^{17, 18}	678
3087	$K_3Fe(CN)_6$	329.173	M.		1.894 ¹⁷	699
3088	$K_4Fe(CN)_6$	368.268			1.898 ¹⁷	
3089	$K_4Fe(CN)_6 \cdot 3H_2O$	422.314	M.			714
3090	$2KF \cdot CoF_2$	213.160	M.		3.22	
3091	$K_2SO_4 \cdot CoSO_4 \cdot 6H_2O$	437.382	M.		2.218	492
3092	$K_2SeO_4 \cdot CoSeO_4 \cdot 6H_2O$	531.652	M.		2.514	589
3093	$[Co(NH_3)_2(NO_2)_4]K$	316.159	R.		2.076	
3094	$K_2Co(C_3H_2O_4)_2$ —Malonate	341.191			2.234	
3095	$K_3Co(CN)_6$	332.303	M.		1.906	
3096	$K_2SO_4 \cdot NiSO_4 \cdot 6H_2O$	437.102	M.	d. <100	2.237	514
3097	$K_2Ni(SeO_4)_2 \cdot 6H_2O$	531.372	M.	d. <100	2.539	608
3098	$K_2Ni(COS)_4$	377.140	M.		2.132 ^{18, 19}	125
3099	$2KCN \cdot Ni(CN)_2 \cdot H_2O$	258.927	M.		1.871 ^{14, 15}	
3100	$K_2O \cdot CrO_3$ —Tarapacite	194.200	R.	97.5	2.732 ¹⁸	927
3101	$K_2Cr_2O_7$	294.210	Tri.	398	2.69	924
3102	$K_2Cr_2O_{10}$	394.220	M.	250	2.648	
3103	$K_2Cr_2O_{11}$	494.230	M.	215	2.649	
3104	$KCrClO_4$	174.563	M.	d.	2.497 ¹⁹	
3105	$K_2O \cdot 2CrO_3 \cdot I_2O_5$	628.074			3.66	
3106	$K_2Cr_2SO_7$	274.265		350		
3107	$K_2SO_4 \cdot Cr_2(SO_4)_3 \cdot 24H_2O$	998.840	C.		1.83	95
3108	K_2CrSeO_7	321.400		120		
3109	$3K_2CrO_4 \cdot 2(NH_4)_2CrO_4$	886.775			2.403 ¹⁶	
3110	$K_2O \cdot Cr_2O_3 \cdot 2P_2O_5$	530.306	M.		3.520	
3111	$K_3Cr(CN)_6$	325.343	M.	150 d	1.71	607
3112	$K_3Cr(SCN)_6 \cdot 4H_2O$	589.795	R.		1.711 ¹⁶	
3113	$K_2Cr_2O_7 \cdot HgCl_2$	565.736	R.		3.531 ¹¹	
3114	$K_2Cr_2O_7 \cdot Hg(CN)_2 \cdot 2H_2O$	582.867	R.			1077
3115	K_2MoO_4	238.190		919	1.2.342 ^{18, 19}	
3116	K_2WO_4	326.190	M.	921	3.120 ^{19, 21}	
				Tr. 388		
				555		
3117	$K_2W_2O_7$	558.190				
3118	$K_2O \cdot 8WO_3$	1950.19			6.53	
3119	$K_2SeO_4 \cdot Cr_2(SeO_4)_3 \cdot 24H_2O$	1187.38			2.078 ^{17, 18}	
3120	$K_4U(C_2O_4)_4 \cdot 5H_2O$	772.627	M.		2.563	
3121	$KUO_2(C_2H_3O_2)_3 \cdot H_2O$	504.350	Tet.		2.396	
3122	$KV(SO_4)_2 \cdot 12H_2O$	498.370			1.782	
3123	$K_4V_2S_6O_{18} \cdot 3H_2O$	520.736			2.144	
3124	$K_2O \cdot 2UO_3 \cdot V_2O_5 \cdot 8H_2O$ —Carnotite	960.573	H. R.			988
3125	$3K_2O \cdot SiO_2 \cdot V_2O_5 \cdot 10WO_3 \cdot 22H_2O$	3240.89	C.		3.664	
3126	$7K_2O \cdot 2SiO_2 \cdot 3V_2O_5 \cdot 18WO_3 \cdot 42H_2O$	6257.86	M. Tri.		3.537	
3127	$NH_4K_4O_3SiO_2 \cdot V_2O_5 \cdot 10WO_3 \cdot 23H_2O$	3237.85			3.74	

Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O	Os	P	Pb	Pd	Pr	Pt	Ra	Rb	Rh	Ru	S	Sa	Sb	Se	Si	Sn	Sr	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr	
76	42	47	11	82	51	61	45	1	25	12	23	41	60	37	80	54	40	39	8	53	14	56	9	18	22	78	52	86	10	24	19	27	70	40	50	48	57	71	28	21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
					4.56	
3128	2KF.TaF ₅	392 690	R.			
3129	K ₂ O B ₂ O ₃	163 830	M.	947		
3130	KB ₂ F ₄	125 915	C. R.	500 d.	2.50	
3131	KBO ₂ KPO ₃	200 034		872		
3132	3KF.AlF ₃	258 245		1035		
				Tr. 300		
3133	K ₂ O Al ₂ O ₃ 48O ₂ 24H ₂ O—Kahnite	948 740	M. C.		1.75	77.442
3134	K ₂ O 3Al ₂ O ₃ 48O ₂ 6H ₂ O—Alumite	828 302	Trig.		2.60	281
3135	KAl(SeO ₄) ₂ 12H ₂ O	568 640	C.		2.001	93
3136	K ₂ O Al ₂ O ₃ 28O ₂ —Kaliophyllite	316 230	H.	>1745	2.6	258
3137	K ₂ O Al ₂ O ₃ 48O ₂ —Leucite	436 350		>1800	2.47	114
3138	K ₂ O Al ₂ O ₃ 68O ₂ —Microcline	556 470	Tri.	1150	2.56	613
3139	K ₂ O Al ₂ O ₃ 68O ₂ —Orthoclase	556 470	M.	1170 d.	2.56	606
3140	K ₂ O 3Al ₂ O ₃ 68O ₂ 2H ₂ O—Muscovite	796 341	M.	d.	2.9	731
3141	2Al ₂ O ₃ 3B ₂ O ₃ K ₂ O—Rhodizite	506 950	C.		3.4	151
3142	K ₂ La(NO ₃) ₆ 5H ₂ O	554 163	R.	d. 60	2.54 ⁰	
3143	K ₂ Ce(NO ₃) ₆ 2H ₂ O	564 511	R.	d. 180		
3143.5	K ₂ HfF ₆	371 19	M.			1037 1
3143.6	K ₂ HfF ₇	429 285	C.			68.1
3144	KMgF ₃	120 415			2.8	
3145	K ₂ MgF ₄	178 510			2.7	
3146	KCl.MgCl ₂ 6H ₂ O—Carnallite	277 881	R.	167	1.60	467
3147	K ₂ LiMg ₂ 6H ₂ O	552 303			2.547	
3148	K ₂ SO ₄ .MgSO ₄ 4H ₂ O—Leonite	366 702	M.		2.25	493
3149	K ₂ O.MgO.28O ₂ 6H ₂ O—Picrosmite	402 732	M.	d. 72	2.15	451
3150	K ₂ SO ₄ .2MgSO ₄ —Langbeinite	415 025	C.		2.83	128
3151	KCl.MgSO ₄ 3H ₂ O—Kamite	248 984	M.		2.13	553
3152	K ₂ Mg(SeO ₄) ₂ 6H ₂ O	497.002	M.		2.34	527
3153	KMgPO ₄	158 439	R.		2.6	
3154	K ₂ Mg(P ₂ O ₇) ₂	576 654	M.		2.4	
3155	KHMg(CO ₃) ₂ 4H ₂ O	256 484	Tri.	d. 100	1.98	
3156	K ₂ Mg(CrO ₄) ₂ 2H ₂ O	370 561	Tri.		2.60 ¹⁵	
3157	K ₂ O.4MgO.11B ₂ O ₃ 18H ₂ O—Heintzeite	1345 79	M.		2.1	611
3158	KCl.CuCl ₂ —Chlorocalcite	185 539	C.	754		591
3159	K ₂ O.CuO.28O ₂ 5H ₂ O—Syngenite	289 310	M.		2.60	581
3160	K ₂ CaP ₂ O ₇	292 308	H.		2.7	
3161	K ₂ Ca(CO ₃) ₂	238 260	R.	790		
3162	K ₂ O.8CaO.16SiO ₂ 16H ₂ O—Apophyllite	1791 96	C.		2.35	259
3163	K ₂ CrO ₄ .CuCrO ₄ 2H ₂ O	386 311	Tri.		2.502	
3164	K ₂ O.4CaO.2Al ₂ O ₃ 24SiO ₂ H ₂ O—Milarite	1981 77	H.		2.57	254
3165	K ₂ O.2CaO.MgO.48O ₂ 2H ₂ O—Polyhalite	602 941	R.		2.78	685
3166	K ₂ SO ₄ .4CaSO ₄ MgSO ₄ 2H ₂ O—Krugite	875 211			2.801	
3167	KCl.2SrCl ₂	391 625		638		
3168	2KCl.SrCl ₂	307 642	R.	597		
3169	K ₂ SrP ₂ O ₇	339 858	H.		2.9	
3170	K ₂ SrCr(C ₂ O ₄) ₂ 6H ₂ O	550 817			2.155 ¹²	
3171	K ₂ Bu(CO ₃) ₂	335 560		800		
3172	K ₂ Bu(CO ₃) ₄	573 820		758		
3173	LiKSO ₄	142 099	H.		2.393	218
3174	2KNO ₃ .LaNO ₃ .Bu(NO ₃) ₃	570 177		515	3.21 ¹⁵	
3175	LiKCO ₃	106 034				601
3176	LiK(dl-C ₄ H ₄ O ₆).H ₂ O	212 080	R.		1.610	1075
3177	KLi(dl-C ₄ H ₄ O ₆).H ₂ O	212 080	M.			798
3178	KLiPt(CN) ₄ 3H ₂ O	399 342	R.			753
3179	K ₂ La ₃ Fe(CN) ₆ 3H ₂ O	358 002	M.			
3180	KLiMoO ₄ H ₂ O	224 049	R.		2.696	
3181	K ₂ Na(SO ₄) ₂ —Glaserite	332 412	Trig.	<1000	2.696	237
3182	KNaHASO ₄ 7H ₂ O	328 168			1.884	
3183	KNa(dl-C ₄ H ₄ O ₆).3H ₂ O	264 169	M.		1.783	
3184	KNaC ₄ H ₄ O ₆ 4H ₂ O—Rochelle salt	282 184	R.		1.790	517
3185	KCl.11Na ₂ O.98O ₂ 2CO ₂ —Hanksite	1565 07	H.		2.56	222
3186	3KCl.NaCl.FeCl ₂ —Rinneite	408 870	Trig.		2.35	290
3187	K ₂ Na(CrO ₄) ₂	372 302	Trig.		2.767	351

Ag 55

Al 13

As 33

Au 33

B 5

Ba 75

Be 15

Bi 5

Br 5

C 16

Ca 77

Cl 61

Co 29

Cr 59

Cu 44

Fe 45

F 31

Gd 44

H 46

I 45

K 31

La 44

Li 46

Mg 31

Mn 44

Ni 45

O 31

P 44

S 45

Se 44

Si 31

Ta 44

Tb 45

Tl 46

U 31

V 44

W 45

Xe 44

Y 31

Zn 44

Zr 45

Ag 55

Al 13

As 33

Au 33

B 5

Ba 75

Be 15

Bi 5

Br 5

C 16

Ca 77

Cl 61

Co 29

Cr 59

Cu 44

Fe 45

F 31

Gd 44

H 46

I 45

K 31

La 44

Li 46

Mg 31

Mn 44

Ni 45

O 31

P 44

S 45

Se 44

Si 31

Ta 44

Tb 45

Tl 46

U 31

V 44

W 45

Xe 44

Y 31

Zn 44

Zr 45

TABLE: 83-82 TO 84-27

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. and finding No.
3188	$5K_2W_2O_{12} \cdot 2Na_2W_2O_{12}$	7534.93			7.117	
3189	$(CaK_2Na_2)O \cdot Al_2O_3 \cdot 6SiO_2 \cdot 6H_2O$ — Erionite					
3190	Rb_2O	186.880	R.	d. 400	2.0	435
3191	Rb_2O_2	202.880			3.72	
3192	Rb_2O_3	218.880			3.65	
3193	Rb_2O_4	234.880			3.53	
3194	RbH	86.4477		280	3.05 ⁹	
3195	$RbOH$	102.448		d. 300	2	
3196	RbF	104.440		300	3.203 ¹¹	
3197	$RbCl$	120.898		700	1.2.88 ¹²⁰	
				715	2.76	104
					1.2.088 ¹²⁰	
3198	$RbClO_3$	168.898			3.19	
3199	$RbClO_4$	184.898	R.		2.9	
3200	$RbBr$	165.356	C.	082	3.35	133
					1.2.795 ¹²⁰	
3201	$RbBr_3$	325.188	R.	d. 140		
3202	$RbBrO_3$	213.356		430	3.68	
3203	$RbBrCl_2$	236.272	R.	d. 110		
3204	$RbBr_2Cl$	280.730	R.	76		
3205	RbI	212.372	C.	612	3.55	146
					1.2.873 ¹²⁰	
3206	RbI_3	466.236	R.	190		
3207	$RbIO_3$	280.372	M. 2, C.	d.	1.33 ¹⁹	
3208	$RbIO_4$	276.372	Tet.		3.918 ¹⁶	
3209	$RbICl_2$	283.288	R.	190		
3210	$RbIBr_2$	372.204	R.	225		
3211	$RbIBrCl$	327.746	R.	205		
3212	Rb_2S	202.945			2.912	
3213	Rb_2S_2	267.075		213		
3214	Rb_2S_3	331.205		225	2.618 ¹⁸	
3215	Rb_2SO_4	266.945	R.	1060	3.613	576
				Tr. 653	1.2.529 ¹⁰⁰	
3216	$Rb_2S_2O_4$	331.010	H.			217
3217	$Rb_2S_2O_5$	363.010	M.			502
3218	$RbHSO_4$	182.513			2.892 ¹⁶	
3219	RbI_4SO_2	468.632		13.5		
3220	Rb_2SeO_4	314.080	R.		3.90	673
3221	$RbNO_2$	147.448	H.	Tr. 161.4 to C.	3.11	594
			C.	Tr. 219 to R.	1.2.395 ¹⁰⁰	
			R. Tri.	310		
3222	$RbNO_3 \cdot HNO_3$	210.464	Tet.	62		
3223	$RbNO_3 \cdot 2HNO_3$	273.479		45		
3224	Rb_2CO_3	230.880		837		
3225	$RbH_2(C_2O_4)_2 \cdot 2H_2O$	300.494	Tri.		2.125 ¹⁸	
3226	$Rb(dl-C_4H_8O_6)$	234.479	Tri.		2.282	
3227	$Rb(meso-C_4H_8O_6) \cdot 0.5H_2O$	243.486	Tri.		2.399	
3228	$RbHC_8H_4O_4$ —Phthalate	250.479	R.		1.933	
3229	$Rb_2(d-C_4H_8O_6)$	318.911	Tri.		2.692	
3230	$Rb_2(meso-C_4H_8O_6) \cdot H_2O$	336.926	Tri.		2.584	569
3231	$Rb_2(meso-C_4H_8O_6) \cdot 2H_2O$	354.942	M.			496
3232	$Rb_2C_8H_4O_7$ —Citrate	360.926		212 d.		
3233	$RbH(CCl_3CO_2)_2$	411.196	M.		2.150 ¹⁸	
3234	$RbSCN$	143.513		195		
3235	Rb_2SiF_6	312.940			3.332	
3236	$RbTi(SO_4)_2 \cdot 12H_2O$	541.655	C.			199
3237	$RbPbCl_3$	399.014	R.	410		
3238	$RbPb_2Cl_6$	677.130	R.	423		
3239	$RbGa(SO_4)_2 \cdot 12H_2O$	563.475	C.		1.962	87
3240	$Rb_2InCl_4 \cdot H_2O$	480.985	R.		3.087	
3241	$Rb_2InBr_4 \cdot H_2O$	703.275			3.409	
3242	$RbIn(SO_4)_2 \cdot 12H_2O$	608.555	C.	42	2.065	83
3243	$Rb_2TiCl_4 \cdot H_2O$	570.585			3.513	

Mg Mn Mo N Na Nb Nd Ni O P Pb Pd Pr Ra Rb Ru S Se Si Sn Sr Ta Tb Ti Th U V W Y Zn Zr
 76 42 47 11 83 51 61 45 1 25 12 23 41 60 37 80 84 40 39 8 63 56 56 9 15 22 78 82 66 10 24 71 27 70 49 50 46 57 71 28 21

Index No.	Formula	Mol. wt	Crystal system	M. P.	d_{40}^{20}	Ref. ind. finding No.
3244	Rb ₃ TlBr ₆ ·2H ₂ O	976 247			4.077	
3245	Rb ₃ Zn(SO ₄) ₂ ·6H ₂ O	538 482	M.		2.591	490
3246	Rb ₃ Zn(SeO ₄) ₂ ·6H ₂ O	630 752	M.		2.860	508
3247	Rb ₃ Cd(SO ₄) ₂ ·6H ₂ O	583 512			2.695	485
3248	2RbCl·CuCl ₂ ·2H ₂ O	412 313			2.895	
3249	Rb ₃ Cu(SO ₄) ₂ ·6H ₂ O	534 672	M.		2 57	510
3250	Rb ₃ AgBi(NO ₃) ₈	763 808			3 67 ¹⁵	
3251	Rb ₃ SO ₄ ·Fe ₂ (SO ₄) ₃ ·24H ₂ O	1373 71	C	109		
3253	RbRh(SO ₄) ₂ ·12H ₂ O	596 665	C			109
3254	RbMnO ₄	204 370			3 235 ^{10 4}	
3255	Rb ₃ Mn(SO ₄) ₂ ·6H ₂ O	526 632	M		2 46	474
3256	RbFeCl ₄ ·2H ₂ O	283 685			2 711	
3257	Rb ₃ FeCl ₄ ·2H ₂ O	404 583			2 850	
3258	Rb ₃ Fe(SO ₄) ₂ ·6H ₂ O	526 942	M.		2 518	405
3259	RbFe(SO ₄) ₂ ·12H ₂ O	549 595	C.		1 92	98
3260	Rb ₃ FeSe ₂ O ₈ ·6H ₂ O	621 212			2 819	
3261	Rb ₃ SeO ₄ ·Fe ₂ (SeO ₄) ₃ ·24H ₂ O	1287 73	C	45	2 131 ¹⁵	111
3262	Rb ₃ Co(SO ₄) ₂ ·6H ₂ O	530 672	M		2 567	515
3263	Rb ₃ Co(C ₂ H ₃ O ₄) ₂ ·4H ₂ O--Malonate	505 942			2 131	
3264	Rb ₃ SO ₄ ·NaSO ₄ ·6H ₂ O	529 792	M.		2 586	523
3265	Rb ₃ SO ₄ ·Cr ₂ (SO ₄) ₃ ·24H ₂ O	1091 53	C.	107	1 946	96
3266	RbV(SO ₄) ₂ ·12H ₂ O	544 715			1.915 ⁴	
3267	3RbF·AlF ₃	397 280		985		
3268	Rb ₃ SO ₄ ·Al ₂ (SO ₄) ₃ ·24H ₂ O	1011 43	C.		1.867 ⁰	78
3269	Rb ₃ La(NO ₃) ₆ ·4H ₂ O	691 892	M.	80	2 497 ⁰	
3270	Rb ₃ Ce(NO ₃) ₆ ·4H ₂ O	693 232	M.	70	2 497 ⁰	
3271	Rb ₃ Pr(NO ₃) ₆ ·4H ₂ O	693 902		63 5	2 50 ⁰	
3272	Rb ₃ Nd(NO ₃) ₆ ·4H ₂ O	697 252		47	2 56 ⁰	
3273	Rb ₃ Mg(SO ₄) ₂ ·6H ₂ O	495 422	M.		2 40	461
3274	Rb ₃ Mg(SeO ₄) ₂ ·6H ₂ O	589 692	M		2 684	549
3275	Rb ₃ Mg(CrO ₄) ₂ ·6H ₂ O	535 312	M		2 466	805
3276	RbLa(d-C ₄ H ₇ O ₆) ₂ ·H ₂ O	258 425	R		2 281	671
3277	RbNa(meso-C ₄ H ₇ O ₆) ₂ ·2.5H ₂ O	301 506	Ti		2 20	
3278	Cs ₂ O	281 620			4 36	
3279	Cs ₂ O ₂	313 620		400	4 25 ⁰	
3280	Cs ₂ O ₄	329 620		600		
				515 (in O ₂)	3 68 ⁰	
3281	CsH	133 818			2 7	
3282	CsOH	149 818		Tr. 223		
				272 3	3 675	
3283	CsF	151 810		683	3 586 ¹⁰⁰	
					1. 2 549	
3284	CsCl	168 268	C	646	3 97	144
					1. 2 732 ¹⁰⁰	
3285	CsClO ₃	216 268			3 57 ^{10 5}	
3286	CsClO ₄	232 268			3 327	
3287	CsBr	212 726	C.	636	4 44	152
					1. 3 038 ¹⁰⁰	
3288	CsBr ₃	372 558	R	180		
3289	CsBrO ₃	260 726		420	4 10 ^{10 5}	
3290	CsBrCl ₂	283 642		205		
3291	CsBr ₂ Cl	328 100		191		
3292	CsI	259 742	C	621	4 51	163
					1. 3 114 ¹⁰⁰	
3293	CsI ₃	513 600	R.	207 5		
3294	CsIO ₃	307 742	M.		4 85	
3295	CsIO ₄	323 742	R		4 259	
3296	CsICl ₂	330 658	R.	230	3 86	
3297	CsIBr ₂	419 574		248		
3298	CsI ₂ Br	466 590		195 5		
3299	CsI ₂ BrCl	375 116		235		
3300	Cs ₂ S ₂	329 750		460		
3301	Cs ₂ S ₄	361 815		217		

Ag 83
85 13 33B 54
54 75 15 5C 10
10 77 51 29 59Cl 17
4 44 46 85 3Dy 67
67 69 64 3 43Os 76
25 65 20 75 2Hf 73
73 30 98 6 20Ir 79
79 80 81 72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
3302	Cs_2S_4	393 880		160		
3303	Cs_2S_4	425 945		210	2 806 ¹⁴	
3304	Cs_2S_4	458 010		186		
3305	Cs_2SO_4	361.685	R.	Tr. 660 to H.	1 243	687
				1010	1 3 034 ^{10,10}	
3306	CsHSO_4	229 883	R.	d.	3 352 ¹⁶	
3307	Cs_2SeO_4	408 820	R			752
3308	$\text{Cs}_2(\text{SeO}_4)_2$	552 020	R		1 453	
3309	Cs_2N_4	174 834		315		
3310	Cs_2NO_4	194 818	II	Tr. 161 to C.	3 685	
				414	1 2 713 ¹⁰	
3311	Cs_2NH_2	148 833		260		
3312	$\text{Cs}_2\text{NO}_3 \cdot \text{HNO}_3$	257 834		100		
3313	$\text{Cs}_2\text{NO}_3 \cdot 2\text{HNO}_3$	320 849		35		
3314	$\text{CsHC}_8\text{H}_4\text{O}_4$ —Phthalate	297 849	R		2 178	
3315	$\text{CsH}(\text{CCl}_3\text{CO}_2)_2$	458 566	M		2 143	
3316	Cs_2SiF_6	407 080			3 372 ¹¹	
3317	$\text{Cs}[\text{Ga}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}]$	610 845	C.		2 113	84
3318	$\text{Cs}_2\text{InCl}_5 \cdot \text{H}_2\text{O}$	575 725			3 350	
3319	$\text{Cs}_2\text{InBr}_5 \cdot \text{H}_2\text{O}$	798 015			3 776	
3320	$\text{Cs}[\text{In}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}]$	655 925	C.		2 241	85
3321	$\text{Cs}_2\text{TlCl}_5 \cdot \text{H}_2\text{O}$	665 325			3 879	
3322	$\text{Cs}_2\text{Tl}_2\text{Cl}_9$	1126 35	II.			301
3323	$\text{Cs}_2\text{Zn}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	631 222	M.		2 875	552
3324	$\text{Cs}_2\text{Zn}(\text{SeO}_4)_2 \cdot 6\text{H}_2\text{O}$	725 492	M.		3 115	610
3325	$\text{Cs}_2\text{Cd}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	678 252	M		2 957	536
3326	$\text{CsCd}(\text{CNS})_3$	419 139		213		
3327	$\text{CsCl} \cdot \text{HgCl}_2$	439 794	C. R.			164
3328	Cs_2HgI_4	973 958	M.		4 806	
3329	$\text{Cs}_2\text{Hg}_3\text{I}_8$	1882 91	M.		5 14	
3330	Cs_2HgI_6	1233 70	R.		1 605	
3331	$\text{Cs}_2\text{Cu}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	629 412	M.		2 858	559
3332	$2\text{CsNO}_3 \cdot \text{AgNO}_3 \cdot \text{Bi}(\text{NO}_3)_3$	858 548			3 88 ¹⁹	
3333	$\text{Cs}_2\text{SO}_4 \cdot \text{Ir}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$	1335 64	C.	110		
3334	$\text{CsRh}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	644 035	C.	111		112
3335	Cs_2MnO_4	251 740			3 597 ^{10,11}	
3336	$\text{Cs}_2\text{Mn}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	596 055	C.			200
3337	$\text{Cs}_2\text{Mn}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	620 772	M.		2 710	524
3338	$\text{Cs}_2\text{FeCl}_4 \cdot 2\text{H}_2\text{O}$	331 055			2 907 ¹¹	
3339	$\text{Cs}_2\text{FeCl}_4 \cdot 2\text{H}_2\text{O}$	499 323			3 275	
3340	$\text{Cs}_2\text{Fe}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	596 965	C.		2 061	100
3341	$\text{Cs}_2\text{Fe}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	621 682	M.		2 796	550
3342	$\text{Cs}_2\text{FeSe}_2\text{O}_5 \cdot 6\text{H}_2\text{O}$	715 952	M.		3 694	
3343	$\text{Cs}_2\text{SeO}_4 \cdot \text{Fe}_2(\text{SeO}_4)_3 \cdot 24\text{H}_2\text{O}$	1382 47	C.	60	3 618 ¹⁸	116
3344	$\text{Cs}_2\text{Co}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	624 812	M.		2 841	506
3345	$\text{Cs}_2\text{Co}(\text{C}_2\text{H}_3\text{O}_4)_2 \cdot 4\text{H}_2\text{O}$ —Malonate	600 682			2 682	
3346	$\text{Cs}_2\text{Ni}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	624 532	M.		2 872	575
3347	$\text{Cs}_2\text{Cr}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	593 135	C.	116	2 043	94
3348	$\text{Cs}_2\text{V}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	592 085			2 033 ¹⁴	
3349	$3\text{CsF} \cdot \text{AlF}_3$	539 390		823		
3350	$\text{Cs}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$	1136 17	C.		1 807 ⁰	80
3351	$2\text{Cs}_2\text{O} \cdot 2\text{Al}_2\text{O}_3 \cdot 9\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Pollucite	1325 64	C.		2 9	126
3352	$\text{Cs}_2\text{La}(\text{NO}_3)_5 \cdot 2\text{H}_2\text{O}$	750 601	M.		2 827 ⁰	
3353	$\text{Cs}_2\text{Mg}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	590 162	M.		2 676	488
3354	$\text{Cs}_2\text{Mg}(\text{SeO}_4)_2 \cdot 6\text{H}_2\text{O}$	684 432	M.		2 94	583
3355	$\text{Cs}_2\text{Mg}(\text{CrO}_4)_2 \cdot 6\text{H}_2\text{O}$	630 052	M.		2 747	821
3356	$\text{Cs}_2\text{Cu}_2\text{Sr}(\text{SCN})_7$	1019 69	Tet.		2 882	374
3357	$\text{Cs}_2\text{Cu}_2\text{Ba}(\text{SCN})_7$	1069 45	Tet.		2 92	365
3358	$\text{Cs}_2\text{BaAg}_2(\text{SCN})_7$	1158 07	Tet.		3 026	360
3359	CsLiCl_2	210 665		356 5		

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pt Pr Pu Ra Rb Ru Rh S Sb Se Si Sn Sr Ta Tb Tc Th Ti Tl Tm U V W Y Yb Zn Zr
76 42 47 11 82 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 19 22 78 52 66 10 24 10 27 70 49 50 48 67 71 28 31

BOILING POINTS

General index No.	Boiling point under 1 atm. (or mm of Hg indicated by superscript)	General index No.	Boiling point under 1 atm. (or mm of Hg indicated by superscript)	General index No.	Boiling point under 1 atm. (or mm of Hg indicated by superscript)	General index No.	Boiling point under 1 atm. (or mm of Hg indicated by superscript)
1	100	89	411	204	- 95	294	d. <260
2	152 1	91	339	205	- 75	316	447
4	19 4	92	421	206	- 40	320	453
6	9 9 ¹⁴	95	151 0	207	73 5	322	500 d.
7	3 8 ⁶⁴	96	21 3	208	162	337	-192.0
8	82	97	- 89 5	209	180	338	s. - 78.5
9	- 85 0	98	3 5	210	107 23	339	6 3
13	16 ¹⁵	99	47	211	212	341	2230
17	- 67 0	101	42 5	213	- 8	345	-112.0
21	40 ²¹	102	- 33 35	214	172 9	346	- 15
23	135	103	113 5	215	106	347	53
26	- 35 5 ⁶⁴	104	118 5 ^{73 5}	216	193	348	80
31	s. 110	105	37	217	s. 38 8 ⁷⁹⁴	349	- 15 2
34	97	109	86	218	137 6	350	- 65 ¹⁰⁰¹
35	ca. 97	111	56 5	219	ca. 165	351	- 80 2
36	ca. 77 diss	114	diss. 46 ¹⁴	222	s. 61 8 ⁷⁰⁸	352	57 57
37	s. 101 ¹⁰⁰¹	118	d. 210	223	490	353	139
38	ca. 116	120	s. ca. 140	224	514	356	213
39	- 10 0	125	- 56	226	407 5	357	150 ¹⁵
40	14 6	126	- 63 5	227	523	358	190 ¹⁵
41	s. 10	128	s. 105	228	515	360	137 0
42	- 59 6	129	<71	230	295	361	200
44	74 5	130	exp. 93	232	125	362	153
46	60 ⁹⁰	131	- 5 5	233	ca. 118	363	ca. 300
47	290	132	5	235	205 s. d.	364	- 30
53	167	139	s. 520	237	150 d.	365	8
54	- 30	140	d. <100	238	95 ⁹⁰	366	33
55	- 52	141	exp. 240	250	127 ¹²	367	153
57	59	142	- 2	251	328 5	368	ca. 240
58	138	143	ca. 32	252	224 ¹³	371	2
59	78 8	148	s. 542	253	202 ¹²	372	66
60	69 1	149	235 vac	254	257 ¹³	373	109
62	153 ⁶⁶	164	s. 551	255	201 ¹²	374	0 ¹⁵
63	151.5 ⁷⁶⁵	165	220 vac	256	s. 150 vac.	376	80
64	54 ^{0 14}	166	d. 15	263	-55	377	104
65	68 ⁹⁰	170	s. 135	264	63 ⁷⁶²	378	140.5
66	115 d.	172	357.3	265	- 53	379	290
67	s. 317	177	s. 120	266	122	381	220
68	- 41.2	181	490	268	221	382	113 5
72	- 42	186	d. 160	269	403	383	172
73	100	191	s. 140	271	565	384	235
74	s. - 39	192	s. 80 d.	272	707	385	192
77	d. 288	193	d. > - 13	274	ca. 300 d.	386	230 5
81	176 4	195	90 ⁹⁰⁰	282	- 17	387	255
82	227	197	s. ca. 180	284	149 5	388	s. 940 ⁹⁰
84	183	198	s. 347 (α)	285	390	389	92 ^{15 2}
87	s. 430	199	600 (β)	286	220 2	390	96
88	- 1 8	200	- 87.4	287	92 ⁹⁰	391	150 ^{15 2}
	- 35 5	201	57.5 ⁷³³	291	280	403	s. 2210 diss.
	324	202	s. 280 d.	292	400.6	404	31

TABLE: BOILING POINTS

No.	B. P.	No.	B. P.	No.	B. P.	No.	B. P.
406	27	488	114 1	716	430	1515	78.6
407	63.5	490	620	749	732	1534	973
408	107	491	202	752	650	1552	136.7
409	96 2	492	50 ^m	753	624	1556	78 d.
410	90	493	65 ^m	755	s. 1185	1573	43 ^m
411	134 ^{752 9}	494	65 ^m	760	d. 280	1593	> 1300
412	122	495	720	769	500	1597	170
413	115 5	496	340	770	d. 271	1610	d. 175
414	108	497	191 d	779	1100	1619	3800
415	142	499	1230	797	46	1624	340
416	139 5	508	180	798	118	1646	35
417	132	513	78	799	160	1647	s. 270
418	153 7	514	146	800	220	1648	180
419	171	515	181	825	970	1649	268
420	172 5	517	> 420	829	963	1658	170 d.
421	191	518	270 d.	832	713	1664	35 (in H ₂)
422	187	519	240	845	132	1672	19 5
423	205 ⁷⁵⁶	520	210	870	105	1673	187
425	114 3 ⁷⁵⁶	521	224	881	650	1674	275.6
426	122	522	170	882	383 7	1675	346 7
427	154	523	231	883	304	1676	266
428	153	528	1200	893	s. 345	1677	227 5
429	227	529	950	894	322	1678	333
432	195 ²⁰	530	exp 105	896	310 d.	1679	327
435	100 5 ^{765 7}	543	916		s. 110	1689	6000
436	125	548	954	898	354	1690	6000
437	130	600	s. 475	901	s. 580	1706	69 ^{mt.}
438	149 ^{754 3}	619	110	915	d. 150		s. 56
439	141 5	621	130 ⁷⁵¹	918	96	1714	118
440	154 5	622	53 ¹⁴	919	150	1724	4100
441	201 5 ^{759 4}	623	152 ⁷⁵⁵	920	191	1747	111 2
442	107 ¹⁸	624	70 5 ¹⁸	921	135 ⁹⁰	1749	480
443	230	625	64 5 ¹⁴	922	> 306 d.	1752	148 5 ⁷⁵⁴
444	314 2	626	166 ⁷⁶⁹	939	1366	1753	127
449	284	627	78 ¹⁷	940	903	1755	127.19
450	136 4	628	83 ¹⁴	947	1345	1758	130
451	230	629	70 ¹⁷	951	1200	1767	3000
452	154	630	99 5 ¹⁴	958	d. 400	1796	219
454	> 300	631	105 ¹³	974	170 d.	1797	240.5
459	140	632	96 ¹³	1032	240 d.	1798	s. 400
460	138	633	108 2 ¹⁴	1059	1550	1799	4300
461	4300	634	123 ¹³	1075	444 d.	1802	229.5
465	- 90	635	121 ¹³	1129	s. 265	1803	242
466	29	636	121 ¹³	1147	134	1804	320
467	110 5	637	144 5 ¹³	1148	203	1805	5500
468	86 5	670	s. 610	1149	47 3	1810	87.5
469	72		725	1180	s. 240	1811	17
470	185 9	675	5000	1234	100 8 ¹⁵³	1812	d. 200
471	375	678	535	1268	1190	1813	-101
472	163 5	679	217	1334	s. 1200 diss.	1814	12.5
480	416	693	139 diss.	1342	315	1815	90 6
481	5100	695	300	1397	102.8 ⁷⁴⁹	1817	210
485 5	- 52	696	806	1447	1049	1819	1230 ^{9 4}
486	705	700	815	1509	d. 52	1821	> 3500
487	623	703	824	1513	240	1822	110

INTERNATIONAL CRITICAL TABLES

No.	B. P.	No.	B. P.	No.	B. P.	No.	B. P.
1823	95	2010	d. 100	2500	1500	2921	1416
1824	65	2044	d. 100	2601*		2924	1380
1825	120	2105	590	2604	1670	2926	1330
1826	175	2112	188	2605	1353	2927	d. 225
1827	212	2113	245	2606	d. 270	2931	d. 215
1828	255	2114	270	2608	d. 410	2932	d. 180
1858	2210	2115	331	2610	1265	2936	d. 850
1864	182 7 ¹⁰¹	2116	330	2613	1190	2958	d. 350
	s 177 8	2117	341	2625	d. > 170	2959	d. 400
1865	268	2118	239 ¹⁹	2668	1390	3196	1410
1866	d. 7	2131	1412	2670	1700	3197	1390
1869	382	2232	2850	2671	1413	3200	1340
1870	s 1550 (m N ₂)	2234	450 diss	2677	1390	3205	1300
1879	600 (m H ₂)	2236	> 1600	2680	1300	3283	1250
1893	130	2244	718	2769	1496	3284	1290
1894	194	2285	s 898 6	2846	> 1400	3287	1300
1895	315	2495	795 diss.	2917	1320	3292	1280
1953	4000	2499	1400	2918	1500		

* Hottel, *op. cit.*, 141: 133, 24

REFRACTIVE INDICES

A. LIQUIDS

Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D
1	436	1.833 ^{10,1}	18	45	1.429	34	625	1.5035 ^{22,1}	50	513	1.5201
2	97	1.193 ¹⁶	19	1893	1.432 ¹²	35	627	1.5062 ^{22,1}	51	628	1.5218 ¹¹
3	9	1.256	20	62	1.437 ¹⁴	36	635	1.5081 ²²	52	58	1.527 ¹⁰
4	195	1.317 ^{17,1}	21	111	1.440 ^{22,1}	37	623	1.5082 ²¹	53	918	1.5327 ^{22,1}
5	17	1.325 ¹⁰	22	59	1.444	38	636	1.5097	54	919	1.5399 ^{22,1}
6	102	1.325 ^{18,1}	23	339	1.454	39	637	1.5118 ²¹	55	2644	1.548 ²⁰
7	95	1.330 ⁻²⁰	24	341	1.46	40	633	1.5120 ^{21,1}	56	55	1.557 ¹⁴
8	1	1.333	25	210	1.460 ^{22,1}	41	631	1.5127 ²²	57	1147	1.56 ¹¹
9	426	1.368	26	1808	1.464	42	619	1.5128	58	287	1.601 ¹⁴
10	41	1.374	27	26	1.466 ¹²	43	621	1.5132 ¹⁹	59	450	1.61 ^{10,1}
11	1825	1.381	28	103	1.470 ²²	44	515	1.5143	60	2172	1.618
12	109	1.397 ^{16,1}	29	1894	1.480 ^{18,1}	45	2847	1.515	61	57	1.660 ¹⁴
13	472	1.400	30	629	1.4926	46	621	1.5158 ^{24,1}	62	214	1.697 ^{20,1}
14	1827	1.408	31	634	1.5005	47	207	1.516 ¹⁴	63	1317	1.700
15	38	1.410	32	626	1.5021 ^{21,1}	48	622	1.5174	64	63	1.736
16	2	1.414 ²²	33	632	1.5023	49	630	1.5175 ^{19,1}	65	42	1.885
17	1828	1.421									

B. SOLIDS

I. Isotropic Group. m. = mean value

Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D
66	2670	1.336	95	3107	1.4814	127	2839	1.5305	160	260	1.7550
67	2913	1.339	96	3265	1.4815	128	3150	1.5329	161	1911	1.780
68	398	1.370	97	3084	1.4817	129	2671	1.5442	162	562	1.782
68 1	3143 6	1.403	98	3259	1.4823	130	1241	1.548	163	3292	1.7876
68 2	3017.6	1.408	99	2870	1.483	131	1451	1.55 (m.)	164	3327	1.792
69	344	1.41	100	3340	1.4839	132	1536	1.55 (m.)	165	1923	1.800
70	3032	1.4115	101	1613	1.4842	133	3200	1.5530	166	1028	1.801
70 1	2099 6	1.426	102	1369	1.4854	134	2924	1.5590	167	1921	1.811
70 2	478 5	1.433	103	2021	1.4903	135	2458	1.5667	168	2232	1.83
71	2235	1.4339	104	3197	1.493	136	1576	1.57	169	2282	1.83
72	2855	1.4388	105	2873	1.495	137	2531	1.5717	170	2364	1.838
73	2596	1.444	106	2902	1.496	138	2679	1.5943	171	1261	1.862?
74	2732	1.452	107	1910	1.4976	139	1187	1.6000	172	945	1.864 (m.)
75	1897	1.454	108	2872	1.50	140	2438	<1.6	173	939	1.93
76	2700	1.454	109	3253	1.5004	141	2394	1.608	174	278	2.0
77	3133	1.4562	109 5	2835	1.501	142	1383	1.61	175	402	2.05
78	3268	1.4566	110	743	1.5066	143	1576	1.61	176	1048	2.05
79	2760	1.457	111	3261	1.5070 ¹⁸	144	3284	1.6418	177	1050	2.0710
80	3350	1.4587	112	3334	1.5077	145	132	1.642	178	280	2.087
81	1882	1.4594	113	2887	1.508	146	3205	1.6474	179	581	2.09?
82	344	1.46	114	3137	1.509	147	3019	1.6574	180	1258	2.14
83	3242	1.4638	115	1240	1.5103	148	2267	1.660 (m.)	181	1639	2.16
84	3317	1.4649	116	3343	1.5116 ¹⁸	149	2401	1.67	182	698	2.20
85	3320	1.4652	117	2137	1.514	150	2926	1.6770	183	1123	2.20
86	3025	1.4653	118	2886	1.5144	151	3141	1.69	184	2333	2.20
87	3239	1.4658	119	2674	1.5151	152	3287	1.6984	185	1062	2.253
88	690	1.4664	120	2236	1.52	153	148	1.7031	186	951	2.346
89	680	1.4684	121	3047	1.522 (m.)	154	2225	1.705	187	756	2.3682
90	2740	1.4693	122	1633	1.5228	155	2392	1.710	188	936	2.705
91	2332	1.4736	123	2842	1.5230	156	2222	1.723			
92	2809	1.48	124	1422	1.5236	157	2415	1.735	188 1		2.89
93	3135	1.4801	125	3098	1.54 (m.)	158	2128	1.7364	188 2		3.56
94	3347	1.4810	126	3351	5.521	159	1145	1.74 (m.)	189	552	3.912

INTERNATIONAL CRITICAL TABLES

MISCELLANEOUS

Serial No.	Gen. index No.	Refractive index n	Serial No.	Gen. index No.	Refractive index n	Serial No.	Gen. index No.	Refractive index n	Serial No.	Gen. index No.	Refractive index n
190	367	1.579 ^{12.2} (F)	193	232	1.563 ¹¹ (C)	196	1274	2.69 (Li)	199	3236	1.46 (red)
191	296	1.621 ¹⁴ (F)	194	2196	2.35 (Li)	197	1273	2.70 (Li)	200	3336	1.48 (red)
192	352	1.412 (C)	195	890	2.49 (Li)	198	1053	>2.72 (Li)	201	1528	2.18 (red)

II. Uniaxial Group

Serial No.	Gen. Index No.	Refractive index		Serial No.	Gen. index No.	Refractive index	
		ω	ϵ			ω	ϵ
202	2778	1.309	1.296	247	2224	1.512	1.498
203	1	1.309	1.313	248	2866	1.518	1.522
204	2182	1.3439	1.3602	249	2422	1.522	1.513
205	2851	1.349	1.342	250	243	1.5246	1.4792
206	1323	1.3570	1.3742	251	2336	1.527	1.539
207	1409	1.3638	1.3848	252	764	1.5291	1.5039
208	2130	1.378	1.390	253	2453	1.5296	1.5252
209	814	1.3824	1.3992	254	3104	1.532	1.529
210	1583	1.3910	1.4066	255	1358	1.533	1.575
211	1047	1.4092	1.4080	256	1912	1.534	1.514
212	2237	1.417	1.393	257	2439	1.5364	1.4866
213	2347	1.436	1.478	258	3136	1.537	1.533
214	2713	1.4458	1.4524	259	3162	1.537	1.535
215	2941	1.455	1.515	260	1892	1.539	1.511
216	2735	1.4567	1.4662	261	2871	1.539	1.537
217	3216	1.4574	1.5078	262	1551	1.5393	1.5125
218	3173	1.4715	1.4721	263	2839	1.5398	1.5475
219	2107	1.4720	1.4395	264	2200	1.540	1.510
220	2119	1.473	1.435	265	2207	1.542	1.516
221	2412	1.475	1.486	266	2801	1.542	1.538
222	3185	1.481	1.461	267	342	1.544	1.553
223	1731	1.481	1.493	268	2659	1.545	
224	1970	1.482	1.473	269	2250	1.5496	
225	1995	1.482	1.474	270	1359	1.5519	1.5575
226	2018	1.486	1.479	270 5	2099 5	1.557	1.543
227	2031	1.487	1.479	271	2804	1.558	1.613
228	340	1.487	1.484	272	2129	1.559	1.580
229	2804	1.487	1.486	273	2226	1.56	
230	2493	1.487	1.496	274	1902	1.560	1.580
231	2397	1.49		274 5	475 5	1.563	1.552
232	2880	1.490	1.471	275	2199	1.565	
233	2086	1.490	1.480	276	2326	1.565	1.560
234	2054	1.490	1.481	277	2211	1.565	1.575
235	2072	1.490	1.482	278	2971	1.567	1.518
236	2869	1.490	1.502	279	2420	1.5690	1.6700
237	3181	1.4901	1.4996	280	1340	1.57	
238	1955	1.493	1.480	281	3134	1.572	1.592
239	2061	1.494	1.484	282	2357	1.575	1.57
240	2081	1.495	1.480	283	276	1.5766	1.5217
241	2403	1.496	1.491	284	2125	1.581	1.575
242	2436	1.4991	1.4758	285	1379	1.582	1.645
243	2329	1.507	1.468	286	1872	1.583	1.602
244	2968	1.5095	1.4684	287	2856	1.585	
245	2840	1.5095	1.5232	288	2705	1.5874	1.3361
246	1547	1.5109	1.4873	289	2188	1.5885	1.5970

TABLE: REFRACTIVE INDICES

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Serial No.	Gen. index No.	Refractive index		Serial No.	Gen. index No.	Refractive index	
		ω	ϵ			ω	ϵ
290	3186	1.589	1.590	346	1904	1.717	1.817
291	3079	1.59		347	2100	1.719	1.733
292	1582	1.59	1.59	348	1951	1.721	1.816
293	3033	1.5906	1.5907	349	1259	1.723	1.681
294	2399	1.595	1.585	350	969	1.724	1.746
295	2417	1.597	1.590	351	3187	1.7278	1.7361
296	847	1.6038	1.6042	352	1025	1.730	1.810
297	2904	1.612	1.593	353	2621	1.735	1.435
298	1978	1.613	1.607	354	978	1.741	1.724
299	2314	1.6150	1.6300	355	1414	1.755	1.82
300	2393	1.617	1.652	356	2563	1.757	1.804
301	1400	1.6198	1.5922	357	2594	1.760	1.577
302	2572	1.621	1.619	358	733	1.768	1.812
303	1737	1.623	1.625	359	1858	1.773	1.773
304	2309	1.625		360	3358	1.7761	1.6788
305	2489	1.629	1.639	361	3322	1.784	1.774
306	1011	1.632	1.575	362	3065	1.7909	1.6527
307	2430	1.633	1.639	363	2201	1.80	
308	2275	1.634	1.631	364	1699	1.80	1.72
309	2273	1.634	1.632	365	3357	1.8013	1.6882
310	2307	1.635	1.631	366	1089	1.8036	1.7983
311	556	1.635	1.653	367	2189	1.815	1.761
312	3042	1.636	1.615	368	1307	1.817	1.6973
313	1934	1.640		369	794	1.818	1.618
314	2490	1.64		370	3085	1.820	1.715
315	2507	1.640	1.633	371	1364	1.82	1.73
316	1252	1.6430		372	1063	1.8400	1.9200
317	1739	1.643	1.623	373	1433	1.85	
318	2234	1.644	1.446	374	3350	1.8535	1.6982
319	1044	1.644	1.697	375	1507	1.855	1.60
320	1046	1.644	1.702	376	2358	1.870	1.792
321	2216	1.65	1.59	377	1394	1.875	1.633
322	2644	1.65	1.67	378	1415	1.875	1.784
324	2441	1.651	1.627	379	1431	1.88	
325	1907	1.654	1.676	380	2330	1.913	1.923
326	2121	1.6542	1.6700	381	2366	1.918	1.934
327	1156	1.6576	1.6666	382	483	1.923	1.908
328	2285	1.6583	1.4864	383	1416	1.93	
329	1439	1.664	1.629	384	2339	1.945	1.971
330	2433	1.666	1.661	385	1324	1.96	
331	2274	1.667	1.666	386	1419	1.96	
332	2341	1.669	1.657	387	483	1.960	2.015
333	2410	1.669	1.658	388	2365	1.967	1.978
334	2537	1.669	1.665	389	569	1.970	1.936
335	2131	1.675	1.59	390	882	1.9733	2.6559
336	1084	1.6769	1.6294	391	485	1.997	2.093
337	2004	1.680	1.685	392	744	2.008	2.029
338	2597	1.681	1.668	393	310	2.01	1.82
339	2425	1.6817	1.5026	394	666	2.07	2.05
340	1914	1.694	1.641	395	657	2.09	1.94
341	812	1.694	1.723	396	658	2.114	2.140
342	2163	1.700	1.500	397	2957	2.12	2.00
343	2538	1.701	1.699	398	537	2.13	2.21
344	1324.1	1.704	1.679	399	587	2.135	2.118
345	2281	1.706	1.698	400	1064	2.21	2.22

INTERNATIONAL CRITICAL TABLES

Serial No.	Gen. index No.	Refractive index		Serial No.	Gen. index No.	Refractive index	
		ω	ϵ			ω	ϵ
401	1095	2 2685	2 182	407	445	2 554	2 493
402	2187	2 31	1 95	408	2354	2 58	2 43
403	1770	2 354	2 299	409	447	2 616	2 903
404	755	2 356	2 378	410	403	2 654	2 697
405	1325	2 481	2 210	411	901	2 854	3 201
406	835	2 506	2 529	412	1095	3 0877	2 7924

MISCELLANEOUS

413	1522	1 3817 (C)	1 3872 (C)	420	1413	2 45 (Li)	2 51 (Li)
414	2035 1	2 005 (667)	2 004 (667)	421	1264	2 46 (Li)	2 15 (Li)
415	1957 1		2 013 (667)	422	1094	2 6 (Li)	
416	2002 1	2 019 (667)	2 007 (667)	423	524	2 665 (Li)	2 535 (Li)
417	526	2 3 (Li)		424	1334	3 01 (Li)	2 94 (Li)
418	538	2 35 (Li)	2 33 (Li)	425	1098	3 084 (Li)	2 881 (Li)
419	1668	2 402 (Li)	2 304 (Li)	426	2471	1 683 (red)	1 587 (red)

III. Biaxial Group

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
427	2852		1 364		462	1876	1 462	1 470	1 471
428	2604	1 394	1 396	1 398	463	343	1 469	1 47	1 473
429	2897		1 413		464	2150	1 4716	1 4730	1 4786
430	2898	1 407	1 414	1 415	465	2729	1 4653	1 4738	1 4804
431	2753	1 405	1 425	1 440	466	2691	1 464	1 474	1 485
432	2718	1 4193	1 4309	1 4493	467	3146	1 466	1 475	1 494
433	2724	1 4321	1 4361	1 4373	468	1874	1 474	1 476	1 483
434	2093		1 44		469	2617	1 460	1 477	1 488
435	3189	1 438	1 44	1 452	470	2398	1 461	1 478	1 485
436	2733	1 439	1 441	1 460	471	1356	1 4713	1 4782	1 4856
437	2723	1 4412	1 4424	1 4526	472	2948	1 475	1 480	1 487
438	2721		1 4434		473	2223	1 476	1 480	1 483
439	411	1 4368	1 4458	1 4510	474	3255	1 4767	1 4807	1 4907
440	2964	1 447	1 448	1 459	475	2708	1 391	1 481	1 486
441	2739	1 4453	1 4496	1 4513	476	2978		1 482	
442	3133	1 430	1 452	1 458	477	1918	1 478	1 482	1 482
443	2710	1 440	1 452	1 453	478	2862	1 480	1 482	1 493
444	2717	1 4499	1 4525	1 4604	479	3083	1 4759	1 4821	1 4969
445	2395	1 448	1 451	1 456	480	2715	1 4777	1 4822	1 5036
446	2890	1 435	1 455	1 459	481	1463	1 477	1 483	1 489
447	2145	1 4326	1 4534	1 4609	482	3029	1 4775	1 4833	1 4969
448	1809	1 310	1 456	1 459	483	2970	1 4768	1 4843	1 4870
449	2854	1 432	1 457	1 458	484	1289	1 4801	1 4840	1 4913
450	2720	1 4401	1 4629	1 4815	485	3247	1 4798	1 4848	1 4948
451	3119	1 4607	1 4629	1 4755	486	2977	1 440	1 485	1 550
452	2757		1 464		487	2719	1 4557	1 4852	1 4873
453	1871	1 459	1 464	1 470	488	3353	1 4857	1 4858	1 4916
454	2727	1 4599	1 4645	1 4649	489	138		1 486	
455	2616		1 465		490	760	1 4620	1 4860	1 4897
456	2738	1 4622	1 4658	1 4782	491	3043	1 4836	1 4864	1 5020
457	2743	1 4649	1 4663	1 4791	492	3091	1 4807	1 4865	1 5004
458	2943	1 4609	1 4669	1 5657	493	3148	1 483	1 487	1 490
459	2165	1 456	1 468	1 507	494	2853	1 484	1 487	1 496
460	2848	1 4468	1 4686	1 4715	495	3258	1 4815	1 4874	1 4977
461	3273	1 4672	1 4689	1 4779	496	3231		1 488	

TABLE: REFRACTIVE INDICES

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
497	2882	1 485	1 488	1 489	552	3323	1 5022	1 5048	1 5093
498	2881	1 486	1 488	1 489	553	3151	1 494	1 505	1 516
499	3245	1 4833	1 4884	1 4975	554	2469	1 497	1 505	1 509
500	854	1 4847	1 4887	1 4959	555	2900	1 505	1 505	1 506
501	1548	1 4609	1 4888	1 4921	556	2950	1 3316	1 5056	1 5064
502	3217	1 4812	1 4888	1 5719	557	2178		1 506	
503	2147	1 4856	1 4892	1 4911	558	2148	1 314	1 506	1 506
504	2725	1 4855	1 4897	1 5041	559	3331	1 5018	1 5061	1 5133
505	1924		1 49		560	1986		1 507	
506	2912		1 490		561	2299	1 493	1 507	1 545
507	1863	1 473	1 490	1 511	562	2132	1 495	1 507	1 528
508	2950	1 479	1 490	1 526	563	2765		1 5073	
509	2408	1 484	1 49	1 495	564	2696	1 4886	1 5079	1 5300
510	3249	1 4886	1 4906	1 5036	565	2868	1 504	1 508	1 545
511	2143		1 491		566	3344	1 5057	1 5085	1 5132
512	2171		1 491		567	2893	1 5043	1 5093	1 5751
513	1368	1 4870	1 4915	1 4989	568	2151	1 5070	1 5093	1 5109
514	3096	1 4836	1 4916	1 5051	569	3230		1 510	
515	3262	1 4859	1 4916	1 5011	570	2383	1 495	1 51	1 520
516	777	1 4888	1 4930	1 4994	571	2777	1 500	1 510	1 515
517	3184	1 492	1 493	1 496	572	2106	1 502	1 510	1 512
518	804		1 494		573	2663	1 504	1 510	1 516
519	2938	1 4935	1 4947	1 4973	574	2772		1 511	
520	2697	1 4820	1 4953	1 5185	575	3316	1 5087	1 5129	1 5162
521	1491	1 4902	1 4953	1 5032	576	3215	1 5131	1 5133	1 5144
522	2157	1 495	1 496	1 504	577	2289	1 510	1 514	1 578
523	3264	1 4895	1 4961	1 5052	578	2317	1 512	1 514	1 515
524	3337	1 4946	1 4966	1 5025	579	2922	1 440	1 515	1 525
525	1716		1 4967		580	2894	1 4435	1 5156	1 5233
526	2259	1 465	1 498	1 504	581	3159	1 500	1 5170	1 5183
527	2771	1 495	1 498	1 499	582	2551	1 500	1 517	1 525
528	2407	1 498	1 499	1 505	583	3354	1 5178	1 5179	1 5236
529	3152	1 4969	1 4991	1 5139	584	2553		1 518	
530	1361		1 500		585	2153	1 514	1 518	1 533
531	2901		1 5		586	2264	1 515	1 518	1 525
532	3014		1 500		587	1875	1 516	1 518	1 533
533	2638	1 40	1 50		588	3031	1 5121	1 5181	1 5335
534	2709	1 418	1 500	1 543	589	3092	1 5135	1 5195	1 5358
535	806	1 480	1 500	1 530	590	2228		1 52	
536	3325	1 498	1 500	1 506	591	3158		1 52	
537	2108	1 4664	1 5007	1 5027	592	2998	1 48	1 52	1 55
538	992	1 4910	1 5007	1 5054	593	2477	1 500	1 520	1 580
539	1557	1 4949	1 5007	1 5081	594	3221	1 51	1 52	1 524
540	2413		1 501		595	2154	1 510	1 520	1 543
541	2930		1 501		596	2860	1 516	1 52	1 520
542	2164	1 495	1 501	1 526	597	2466	1 484	1 521	1 538
543	179	1 4981	1 5016	1 5866	598	3246	1 5162	1 5222	1 5331
544	2498	1 4710	1 5017	ca β	599	1466		1 5225	1 5227
545	2180	1 490	1 502	1 511	600	2249	1 5205	1 5226	1 5296
546	2737	1 4794	1 5021	1 5265	601	3176		1 523	
547	2371	1 499	1 503	1 538	602	174	1 5209	1 5230	1 5330
548	2396	1 501	1 503	1 510	603	3045	1 5096	1 5235	1 5387
549	3274	1 5011	1 5031	1 5135	604	2758	1 407	1 524	1 541
550	3341	1 5003	1 5035	1 5094	605	2405	1 513	1 524	1 525
551	2896	1 491	1 504	1 520	606	3139	1 518	1 524	1 526

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
607	3111	1 5221	1 5244	1 5373	662	2592	1 538	1 549	1 554
608	3097	1 5199	1 5248	1 5339	663	2014	1 5390	1 5494	1 5607
609	2294	1 470	1 525	1 555	664	1886		1 55	
610	2097		1 526		665	2204	1 5211	1 5500	1 5680
611	3157	1 508	1 526	1 550	666	2212	1 53	1 55	1 55
612	1370	1 5201	1 5260	1 5356	667	1032	1 545	1 55	
613	3138	1 522	1 526	1 530	668	2029	1 5413	1 5505	1 5621
614	2641		1 529		669	3074	1 5408	1 5513	1 5634
615	2865	1 525	1 529	1 536	670	2046	1 5427	1 5519	1 5629
616	2807	1 5193	1 5295	1 5436	671	3276		1 552	
617	2985	1 417	1 530	1 533	672	2736	1 5382	1 5535	1 5607
618	2304	1 515	1 530	1 580	673	3220	1 5515	1 5537	1 5582
619	1762	1 518	1 530	1 542	674	2288	1 491	1 555	1 650
620	778	1 5240	1 5300	1 5385	675	1360	1 533	1 555	1 635
621	2280	1 525	1 53	1 550	676	2292	1 545	1 555	1 575
622	2167	1 527	1 530	1 540	677	1927	1 551	1 555	1 562
623	1497	1 5246	1 5311	1 5396	678	3086		1 556	
624	2909	1 4893	1 5314	1 5363	679	2876	1 5520	1 5579	1 5608
625	2889	1 515	1 532	1 536	680	1884	1 551	1 558	1 582
626	2197	1 527	1 532	1 583	681	1925	1 554	1 558	1 573
627	2566		1 533		682	2637	1 530	1 560	1 590 ?
628	2750		1 533		683	2296	1 55	1 56	1 57
629	2190		1 533	1 5769	684	2618	1 5487	1 5602	1 5788
630	2166	1 489	1 534	1 557	685	3165	1 548	1 562	1 567
631	2432	1 517	1 534	1 565	686	188	1 5607	1 5630	1 5846
632	1861	1 5347	1 5347	1 5577	687	3305	1 5598	1 5644	1 5662
633	2286	1 460	1 535	1 545	688	838		1 565	
634	3015	1 495	1 535		689	2780	1 560	1 565	1 574
635	2382	1 500	1 535	1 560	690	1901	1 561	1 565	1 567
636	2302	1 515	1 535	1 575	691	3034		1 565	1 608
637	2142	1 523	1 535	1 586	692	1860	1 566	1 566	1 587
638	2205	1 525	1 535	1 550	693	2642		1 567	
639	993	1 5213	1 5355	1 5395	694	2634	1 428	1 567	1 572
640	3324	1 5326	1 5362	1 5412	695	2298	1 450	1 567	1 600
641	961	1 5140	1 5368	1 5433	696	2774	1 536	1 567	1 649
642	1355	1 528	1 537	1 543	697	3002	1 527	1 568	1 647
643	1558	1 5291	1 5372	1 5406	698	2268	1 565	1 568	1 580
644	2404		1 539		699	3087	1 5660	1 5689	1 5831
645	3004		1 539		700	2877	1 565	1 569	1 569
646	2955	1 5352	1 5390	1 5446	701	2156	1 569	1 570	1 582
647	2179		1 54		702	2159	1 563	1 571	1 596
648	2293	1 460	1 540	1 610	703	2158	1 555	1 572	1 575
649	2218	1 520	1 54	1 545	704	2464	1 559	1 574	1 598
650	2217	1 527	1 540	1 544	705	2369	1 56	1 574	1 580
651	1512		1 542		706	2290	1 495	1 575	1 640
652	1030	1 413	1 542	1 557	707	2308	1 553	1 575	1 577
653	2859	1 466	1 542	1 596	708	2248	1 5693	1 5752	1 6130
654	1363	1 530	1 543	1 595	709	3063	1 5438	1 5754	
655	2981	1 415	1 545	1 565	710	643		1 576	
656	2265	1 539	1 545	1 551	711	1889	1 562	1 576	1 588
657	2878	1 545	1 546	1 551	712	1888	1 574	1 576	1 588
658	2036	1 5392	1 5479	1 5592	713	2504	1 5622	1 577	1 635
659	2558	1 542	1 548	ca. 1 548	714	3089		1 5772	
660	2198	1 544	1 548	1 572	715	2789	1 544	1 578	1 601
661	1950	1 5433	1 5490	1 5755	716	3057	1 569	1 579	1 669

B-TABLE: REFRACTIVE INDICES

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
717	2416	1.578	1.579	1.583	772	2321	1.605	1.61	1.612
718	2359	1.5700	1.5818	1.5961	773	2315	1.610	1.611	1.654
719	2370	1.560	1.582	1.587	774	2421	1.592	1.612	1.621
720	782	1.574	1.582	1.582	775	2559	1.597	1.612	1.621
721	2389		1.583		776	2335	1.609	1.6125	1.619
722	3073		1.5837		777	2173	1.520	1.613	1.639
723	2400	1.576	1.584	1.588	778	2350	1.602	1.613	1.649
724	1885	1.563	1.585	1.592	779	1913	1.588	1.617	1.655
725	2803	1.508	1.586	1.525	780	813	1.614	1.617	1.636
726	2227	1.585	1.586	1.596	781	2184	1.607	1.619	1.639
727	1903	1.552	1.588	1.600	782	1915	1.61	1.62	1.65
728	2181	1.539	1.589	1.589	783	1043	1.61	1.62	1.71
729	2591	1.584	1.589	1.594	784	1905	1.619	1.620	1.627
730	2279	1.5825	1.5891	1.5937	785	2419	1.620	1.620	1.654
731	3140	1.561	1.590	1.594	786	2420	1.609	1.623	1.635
732	2327	1.586	1.59	1.598	787	2583	1.610	1.623	1.623
733	2123	1.5595	1.5908	1.6311	788	2367	1.621	1.623	1.631
734	781	1.572	1.591	1.59	789	2451	1.6220	1.6237	1.6309
735	2385	1.572	1.591	1.594	790	2185	1.617	1.624	1.652
736	3050		1.592		791	809	1.531	1.625	1.659
737	1738	1.582	1.592	1.592	792	1035	1.541	1.625	1.660
738	2384	1.582	1.592	<1.606	793	783	1.614	1.625	1.637
739	2381	1.5863	1.5920	1.6139	794	1382	1.615	1.625	1.665
740	2658	1.579	1.593	1.597	795	2561	1.620	1.625	1.645
741	2798	1.5889	1.5943	1.7163	796	2411	1.616	1.626	1.649
742	1276	1.562	1.595	1.632	797	2431	1.621	1.627	1.635
743	2903	1.571	1.595	1.598	798	3178	1.6237	1.6278	2.2916
744	2523	1.5860	1.5951	1.6072	799	1514	1.532	1.628	1.665
745	2546	1.573	1.597	1.636	800	2316	1.616	1.629	1.631
746	2388	1.586	1.598	1.605	801	1920		1.63	
747	2775	1.573	1.599	1.657	802	1721	1.585	1.630	1.630
748	1987	1.5989	1.5999	1.6003	803	1321	1.602	1.632	1.632
749	2664		1.6		804	2230	1.603	1.632	1.639
750	2867		1.60		805	3275	1.622	1.633	1.644
751	2322	1.595	1.60	1.603	806	2386	1.632	1.634	1.636
752	3307	1.599	1.600	1.600	807	2308		1.635	
753	3179	1.5883	1.6007	1.6316	808	1580	1.541	1.636	1.669
754	2291	1.413	1.602	1.611	809	2767	1.577	1.636	1.639
755	786	1.586	1.602	1.608	810	3012	1.620	1.636	1.638
756	2278	1.590	1.602	1.638	811	1185		1.637	
757	1378	1.579	1.603	1.633	812	2470	1.453	1.637	1.707
758	1935	1.586	1.603	1.623	813	2206	1.636	1.637	1.653
759	2324	1.593	1.603	1.607	814	2640	1.507	1.638	1.698
760	2857	1.594	1.603	1.615	815	1898	1.632	1.638	1.643
761	2152	1.602	1.604	1.615	816	2521	1.6369	1.6381	1.6491
762	1357	1.51	1.605	1.611	817	3068	1.545	1.641	1.760
763	2440	1.567	1.605	1.626	818	2823	1.596	1.641	1.652
764	2122	1.591	1.605	1.614	819	1900	1.638	1.642	1.653
765	2269		1.606		820	2409	1.632	1.643	1.645
766	2895	1.595	1.606	1.634	821	3355	1.637	1.643	1.655
767	2555		1.607		822	2305	1.462	1.643	1.722
768	3003		1.607		823	2349	1.636	1.644	1.654
769	3052		1.6071		824	2320	1.642	1.645	1.654
770	3001	1.571	1.608	1.694	825	2501	1.635	1.646	1.660
771	820	1.617	1.609	1.593	826	1929	1.643	1.649	1.649

INTERNATIONAL CRITICAL TABLES

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
827	2564		1 651		882	2595	1.525	1.684	1.686
828	2177	1 635	1 651	1 670	883	941		1.685	
829	826		1 6513		884	2593	1.681	1.685	1 695
830	1916	1 612	1 652	1 675	885	1005	1 67	1 686	1 698
831	2387	1 625	1 653	1 669	886	1937	1.678	1 686	1 689
832	2176	1 650	1 653	1 658	887	2809		1.687	
833	2214	1 6527	1 6537	1 6748	888	1184	1 687	1 687	1 704
834	2863		1 654		889	1270 1	1.684	1 695	1.698
835	1298	1 647	1 654	1 660	890	1406	1 672	1 697	1 717
836	2175	1 651	1 654	1 660	891	1008	1 695	1 698	1 733
837	1919	1 633	1 655	1 662	892	2815	1 6610	1 6994	1 7510
838	2391	1 643	1 655	1 663	893	2810		1.70	
839	2126	1 652	1 655	1 671	894	2565		1.702	
840	2790	1 6491	1 6555	1 7143	895	2652		1.702	
841	2379	1 540	1 656	1 682	896	2418	1 700	1.702	1.706
842	1295	1 651	1 656	1 683	897	1294	1 695	1 704	1.710
843	1297	1 652	1 656	1 690	898	785	1 660	1 705	1 713
844	1069	1 6272	1 6573	1 6601	899	734		1.707	
845	1569	1 622	1 658	1 687	900	2229	1 705	1.709	1 711
846	1296	1 63	1 66	1 69	901	2428	1 708	1.711	1 718
847	2424	1 640	1 660	1 675	902	2350	1 709	1 711	1.724
848	1439	1 655	1 66	1 670	903	976	1.703	1 713	1 722
849	2910	1 645	1 661	1 688	904	2556	1 614	1 714	1.729
850	1505	1 6263	1 6614	1 6986	905	2480	1 7146	1 7174	1 812
851	1585	1 629	1 662	1 727	906	1720	1 691	1 720	1.720
852	2426	1 651	1 662	1 668	907	1899	1 712	1 720	1 728
853	2163	1 5155	1 664	1 666	908	2318	1 715	1 720	1 737
854	2090	1 660	1 666	1 676	909	2423	1 712	1 721	1 731
855	2372	1 612	1 667	1 669	910	2351	1 686	1 722	1 735
856	2215	1 662	1 667	1.673	911	1859	1.702	1.722	1 750
857	1388	1 635	1 668	1 702	912	1012	1 694	1 726	1 730
858	3064	1 626	1 6684	1 757	913	2510	1 7129	1 7266	1.7441
859	3005	1.185	1 669	1 697	914	1922	1 705	1 729	1 730
860	757	1 658	1 669	1 670	915	2417.1	1 724	1 729	1 734
861	2183		1 670		916	972	1.710	1 731	1 732
862	2340		1 670		917	1377	1 730	1 732	1.762
863	2186	1 608	1 670	1 690	918	793	1 708	1 733	1 758
864	2427	1 661	1 671	1 694	919	1670	1 720	1 733	1 935
865	1908	1 670	1 671	1 689	920	807	1 640	1 736	1 750
866	2858	1 634	1 673	1 685	921	964	1 730	1 737	1 785
867	2330	1 610	1 674	1 679	922	2360	1.732	1 737	1 751
868	2353	1 662	1 674	1 676	923	1841	1.617	1.738	1.776
869	2402	1 665	1 674	1 684	924	3101	1 7202	1 7380	1 8197
870	2905	1 666	1 674	1 688	925	1956	1 731	1 738	1 744
871	2800	1 671	1 674	1 684	926	2208		1.74	
872	2557	1 673	1 674	1 678	927	3100		1 74	
873	1381	1 653	1 675	1 697	928	1408	1.71	1.74	1 76
874	1389		1 676		929	1318	1 733	1.740	1 744
875	2542	1 529	1 676	1 677	930	1930	1.736	1.741	1.746
876	1926	1 643	1 678	1 684	931	1003		1 743	
877	3037	1 648	1 678	1 699	932	997	1.702	1 745	1.789
878	2651	1 676	1 679	1 687	933	2124	1.747	1 748	1 757
879	2741		1 6802		934	2484		1 749	
880	2284	1 5299	1 6809	1 6854	935	1726	1.72	1 75	1.80
881	792	1.662	1 683	1.717	936	1670	1.74	1 75	1.95

3-TABLE: REFRACTIVE INDICES

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Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
937	2781	1.743	1.754	1.764	985	2338	1.910	1.91	1.945
938	1028	1.730	1.758	1.838	986	261	1.871	1.92	2.01
939	967	1.708	1.760	1.798	987	1050	1.885	1.920	1.956
940	1000	1.719	1.762	1.805	988	3124	1.750	1.925	1.95
941	1387	1.765	1.774	1.797	989	1305	1.92	1.95	1.96
942	2573	1.770	1.774	1.783 ?	990	1365	1.702	1.955	1.965
943	2352	1.758	1.776	1.795	991	712	1.9493	1.9592	1.9640
944	966	1.730	1.778	1.803	992	663	1.947	1.961	1.968
945	1303	1.760	1.779	1.779	993	1722	1.955	1.985	2.05
946	1944	1.757	1.78	1.803	994	401		1.99	
947	2127	1.78	1.78	1.785	995	557	1.93	1.99	2.02
948	1045	1.752	1.782	1.815	996	660	1.87	2.00	2.01
949	1319	1.759	1.786	1.797	997	1723	1.90	2.00	2.05
950	1380	1.775	1.786	1.815	998	576		2.03	
951	1006	1.747	1.788	1.829	999	2219	1.908	2.05	2.065
952	1420	1.783	1.788	1.818	1000	573	2.042	2.050	2.050
953	1670	1.78	1.79	2.04	1001	617	1.8037	2.0763	2.0780
954	1300	1.780	1.793	1.802	1002	329		2.09	
955	2337		1.795		1003	2375	1.70	2.10	2.23
956	2808	1.763	1.799	1.813	1004	1326	2.08	2.1	2.16
957	735		1.80		1005	541	1.816	2.102	2.126 ?
958	1362	1.76	1.8	1.81	1006	539	2.0767	2.1161	2.1580
959	1301	1.783	1.801	1.834	1007	1696		2.15	
960	1007	1.79	1.807	1.84	1008	535	2.04	2.15	2.15
961	2376	1.775	1.815	1.825	1009	335	2.14	2.15	2.18
962	2582		1.816		1010	1421	2.12	2.17	2.31
963	583	1.74	1.82		1011	2374	1.77	2.18	2.35
964	1009	1.820	1.826	1.88	1012	473	2.13	2.19	2.20
965	2346	1.800	1.831	1.846	1013	1336	1.94	2.20	2.51
966	2802	1.750	1.832	1.832	1014	1327	2.10	2.20	2.31
967	1049	1.8090	1.8380	1.8593	1015	1391	2.10	2.20	2.33
968	999	1.69	1.84	1.85	1016	529	2.1992	2.2172	2.2506
969	1430	1.773	1.840	1.845	1017	1697	2.17	2.22	2.32
970	2363	1.825	1.842	1.857	1018	1671	2.09	2.24	2.26
971	2221	1.85	1.85	1.99	1019	1807	2.22	2.25	2.29
972	2220	1.85	1.85	2.02	1020	1784	2.17	2.26	2.32
973	639	1.789	1.852	1.877	1021	1781	2.18	2.27	2.35
974	2492		1.865		1022	536	2.24	2.27	2.31
975	707	1.8600	1.8671	1.8853	1023	1694	2.27	2.27	2.30
976	1010	1.73	1.870	1.91	1024	279	2.18	2.35	2.35
977	1027	1.655	1.875	1.909	1025	2331		2.38	
978	1407	1.835	1.877	1.886	1026	1335	2.26	2.39	2.40
979	1794	1.817	1.879	2.057	1027	878	2.37	2.5	2.65
980	1302	1.87	1.88	1.93	1028	446	2.583	2.583	2.741
981	553	1.8771	1.8823	1.8937	1029	917		3	
982	3010	1.527	1.903	1.952	1030	1096		3	
983	2334	1.900	1.907	2.034	1031	1101		3	
984	2361		1.91	1.91	1032	296	3.194	4.046	4.303

MISCELLANEOUS

1033	944	1.831	1.861 (green)	1.880	1037.1	3143.5	1.461	1.449
1034	429	1.3996		1.4102	1037.2	3017.5	1.466	1.455
1035	432	1.4057		1.4165	1038	3009	1.4676	1.620
1036	418	1.4248		1.4382	1039	1399	1.500	1.660
1037	2994	1.452		1.465	1040	2776	1.518	1.527

INTERNATIONAL CRITICAL TABLES

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
1041	2213	1.575		1.649	1061	1412	2.38	2.39 (Li)	2.42
1042	2644	1.584		1.604	1062	1698		2.40 (Li)	
1043	2646	1.594		1.614	1063	1800		2.40 (Li)	
1044	1322	1.62		1.63	1064	1766	2.41	2.50 (Li)	2.51
1045	2348	1.6226		1.7643	1065	1661		2.55 (Li)	
1046	2323	1.641		1.650	1066	1093	2.48	2.58 (Li)	2.60
1047	2570	1.6704			1067	271	2.46	2.59 (Li)	2.61
1048	2414	1.675		1.685	1068	525	2.51	2.61 (Li)	2.71
1049	2319	1.717		1.735	1069	1411		2.62 (Li)	
1050	1075	1.729		1.788	1070	887	2.35	2.64 (Li)	2.66
1051	2549			1.789	1071	272		> 2.72 (Li)	
1052	2560	1.810		1.830	1072	723	> 2.72	> 2.72 (Li)	
1053	716	1.817			1073	298	2.74 (Li)		> 2.72 (Li)
1054	582	1.90		1.97	1074	2770		1.473 (red)	
1055	3081	1.553	1.555 (Li)	1.571	1075	3177		1.5226 (red)	
1056	82	2.00	2.18 (Li)	2.35	1076	2524		1.532 (red)	
1057	2355	2.200	2.200 (Li)	2.290	1077	3114		1.591 (red)	
1058	1263	2.24	2.24 (Li)	2.53	1078	935		2.63 (red)	
1059	599	2.30	2.35 (Li)	2.40					
1060	1631	2.31	2.37 (Li)	2.66					

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C-TABLE

[Compounds of carbon with elements having key-numbers below 16]

Acknowledgement is made to Prof. E. E. Reid for advice in connection with nomenclature and for his reading of the manuscript of this

Gen. index No.	Formula	Name of Table, p. 280	Molecular weight (calculated from atomic weights, p. 48)	Normal melting point, °C	Boiling point under 1 atm. (or melting point indicated by superscript)	Specific gravity, 20°C (or other indicated temperature)	Refractive index, 20°C (or other indicated temperature)
1	CB ₂ O ₃	Bismutospherite	510.00	d.		7.35	
1 1	CB ₂ ClO	Carbonyl bromochloride	143.37		25	1.82 ¹⁵	
2	CBrCl ₃	Bromotrichloromethane	198.29	-21	172	1.959 ¹⁴	697
3	CBrN	Cyanogen bromide	105.92	52	61.6	2.015	
4	CB ₂ O	Carbonyl bromide	187.83		64.5	2.44	
5	CB ₂ NO ₂	Bromopierin	297.76	10.3	127 ¹¹⁵	2.799	826
6	CBr ₄	Carbon tetrabromide	331.66	α48.4 β90.1	189.5	3.42	
7	CClN	Cyanogen chloride	61.466	-6	13.8	1.186	
8	CCl ₂ N ₂ O ₄	Dichlorodinitromethane Cl ₂ C(NO ₂) ₂	171.93	122.5			
9	CCl ₂ O	Carbonyl chloride (Phosgene)	98.916	-104	8.3	1.392	
10	CCl ₂ S	Thiophosgene	114.98		73.5	1.509 ¹⁸	721
11	CCl ₂ NO ₂	Chloropierin Cl ₂ CNO ₂	161.38	-64	112.4	1.692 ⁹	470
12	CCl ₄	Carbon tetrachloride	153.83	-23.0	76.8	1.595	476
13	CF ₄	Carbon tetrafluoride	88.00	-80	-15		
14	CIN	Cyanogen iodide	152.94	146.5			
15	CIN ₂ O ₄	Iodotrinitromethane Cl(NO ₂) ₃	276.96	56			
16	CI ₄	Carbon tetrachloride	519.73	d.		4.32	
17	CN ₂ O ₄	Tetranitromethane C(NO ₂) ₄	196.03	13	125.7	1.650 ¹³	364
17 1	COS	Carbonyl sulfide	61.065	-138	-48	1.24 ⁻⁸⁷	
17 2	CSSe	Carbon selenosulfide	123.265		84.5		
17 3	CS ₂	Carbon disulfide	76.130	-111.6	46.3	1.261 ²² ₂₀	
17 4	CHBrCl ₂	Bromodichloromethane	163.84		92	1.925 ¹⁶	
18	CHBr ₃	Bromoform	252.76	7.7	150.4	2.890	772
19	CHCl ₃	Chloroform	119.38	-63.5	61.2	1.489	417
20	CHF ₃	Fluoroform	70.008		20 ¹⁰ at.	2.53	
21	CHI ₃	Iodoform	393.80	119		4.1	1180
22	CHN	Hydrocyanic acid HCN	27.016	-14	26	0.699	809
23	CHNO	Cyano acid HCNO	43.016	d.		1.140 ⁹	
24	CHNS	Thiocyanic acid HCNS	59.081	5	d.		
25	CHN ₂ O ₄	Nitroform CH(NO ₂) ₃	151.032	15	> 100 d.		
26	CH ₂ Br ₂	Methylene bromide	173.85	-52.8	97.8	2.46 ¹⁵ ₁₆	
27	CH ₂ ClNO	Carbamyl chloride ClCONH ₂	79.481	50	62		
28	CH ₂ Cl ₂	Methylene chloride	84.931	-96.7	40.1	1.336	273
29	CH ₂ I ₂	Methylene iodide	267.88	5.2; 5.7	180 d.	3.325	870
30	CH ₂ N ₄	Cyanamide CN.NH ₂	42.031	44	140 ¹⁹ d.	1.083	1073
31	CH ₂ N ₃	Diazomethane H ₂ C:N ₂	42.031	-145	-23		
32	CH ₂ N ₃ O ₄	Methylnitrolic acid O ₂ NCHNOH	90.031	64			
33	CH ₂ N ₃ O ₄	Dinitromethane H ₂ C(NO ₂) ₂	106.031	< -15	100 d.		
34	CH ₂ N ₄	Tetrazole	70.047	155			
35	CH ₂ O	Formaldehyde HCHO	30.015	-92	-21	0.815 ⁻²⁰	
36	(CH ₂ O) ₄	Paraformaldehyde	(30.015) ₄	160			
37	CH ₂ O ₂	Formic acid HCO ₂ H	46.015	8.4	100.5	1.220	25
38	CH ₂ AsCl ₂	Methylarsine dichloride	160.90	-59	136	1.838	
39	CH ₂ AsO	Methylarsinous oxide	105.98	95			
40	CH ₂ Br	Methyl bromide	94.939	-93	4.6	1.732 ²	
41	CH ₂ Cl	Methyl chloride	50.481	-97.6	-23.7	0.920 ¹⁸	
42	CH ₂ ClO	Methyl hypochlorite CH ₂ OCl	66.481		13.4		
43	CH ₂ ClO ₂ S	Methylsulfone chloride	114.546		160	1.510	
44	CH ₂ F	Methyl fluoride	34.023		-78.0		
45	CH ₂ I	Methyl iodide	141.96	-66.1	42.6	2.279	696
46	CH ₂ NO	Formamide HCONH ₂	45.031	-5	193	1.139	995
47	CH ₂ NO	Formaloxime H ₂ C=NOH	45.031		84		
48	CH ₂ NO ₂	Nitromethane CH ₂ NO ₂	61.031	-29.2	101.9	1.139	43
49	CH ₂ NO ₂	Methyl nitrite CH ₃ ONO	61.031		-12	0.991 ¹¹	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
50	CH ₃ NO ₂	Methyl nitrate CH ₃ ONO ₂	77.031		exp. 65	1.217 ¹⁸	
51	CH ₃ NS	Thioformamide HCSNH ₂	61.096	29			
52	CH ₃ N ₂	Methyl azide	57.047		21	0.869 ⁴	
53	CH ₃ N ₂ O ₂	Nitrourea O ₂ NNHCONH ₂	105.05	150 d.			
54	CH ₄	Methane	16.0308	-184	-161.4	0.415 ⁻¹⁶⁴	
55	CH ₃ N ₂ O	Urea H ₂ NCONH ₂	60.047	132.7		1.335	1167
56	CH ₃ N ₂ O ₂	Methylnitramine CH ₃ NHNO ₂	76.047	38		1.243 ^{45, 6}	1077
57	CH ₃ N ₂ S	Ammonium thiocyanate	76.112	119.6	d 160	1.305	
58	CH ₃ N ₂ S	Thiourea H ₂ NCSNH ₂	76.112	182		1.405	
59	CH ₃ N ₂ O ₂	Nitroguanidine H ₂ NC(NH)N HNO ₂	104.063	231			
60	CH ₃ O	Methyl alcohol CH ₃ OH	32.031	97.8	64.5	0.792	2
61	CH ₃ O ₂ S	Methylsulfonic acid CH ₃ SO ₃ H	96.096		107 ¹⁰	1.481	
62	CH ₃ O ₂ S	Methyl sulfuric acid CH ₃ SO ₃ H	112.09	< -30			
63	CH ₃ SH	Methylmercaptan CH ₃ SH	48.096	121.0	7.6	0.868	
64	CH ₃ As	Methylarsine CH ₃ AsH ₂	91.999		2		
64.1	CH ₃ AsO ₂	Methyl arsenate CH ₃ AsO(OH) ₂	139.999	161			1234
65	CH ₃ N	Methylamine CH ₃ NH ₂	31.047	92.5	-6.5	0.699 ⁻¹¹	
66	CH ₃ NO	N-Methylhydroxylamine CH ₃ NHOH	47.047	42	62.5 ¹¹	1.0003	226
67	CH ₃ NO ₂	Ammonium formate HCO ₂ NH ₄	63.047	116		1.266	
67.1	CH ₃ NO ₂	Ammonium hydrogen carbonate	79.047	d		1.573	1223
68	CH ₃ N ₂	Diazoaminomethane	59.063	-12	92 s d		
69	CH ₃ N ₂ O	Semicarbazide H ₂ NCONHNH ₂	75.063	96			
70	CH ₃ N ₂ O ₂	Urea nitrate H ₂ NCONH ₂ HNO ₃	123.06	153 d		1.664	
71	CH ₃ N ₂ S	Thiosemicarbazide H ₂ NCSNHNH ₂	91.128	183			
72	CH ₃ O ₂ P	Methylphosphinic acid CH ₃ PO(OH) ₂	96.063	105			
73	CH ₃ P	Methylphosphine CH ₃ PH ₂	48.063		-11		
74	CH ₃ CIN	Methylamine hydrochloride	67.512	226	230 ¹⁶		
75	CH ₃ CIN ₂	Guanidine hydrochloride	95.528				1333
76	CH ₃ CIN ₂ O	Semicarbazide hydrochloride	111.53	173 d.			
77	CH ₃ N ₂	Methylhydrazine CH ₃ NHNH ₂	46.062		87.5		
78	CH ₃ N ₄	Methyltetrazine CH ₃ NHN·NNH ₂	74.078		130		
79	CH ₃ N ₂ O ₂	Guanidine nitrite (NH ₂) ₂ C(NH)HNO ₂	106.08	78.5			
80	CH ₃ N ₂ O ₂	Guanidine nitrate	122.079				1333
81	CH ₃ N ₂ O ₂	Semicarbazide nitrate	138.08	123			
82	CH ₃ CINH ₄	Aminoguanidine hydrochloride	110.54	163			
83	C ₂ Br ₂	Dibromoacetylene BrC≡CBr	183.83		70	2	
84	C ₂ Br ₂ Cl ₂	1, 2-Dibromo-1, 2-dichloroethylene	254.75	4.4	172	2.304 ¹⁸	804
84.1	C ₂ Br ₂ Cl ₂	1, 2-Dibromo-1, 1, 2, 2-tetrachloroethane	325.66			2.713	1308
85	C ₂ Br ₂ O ₂	Oxalyl bromide (COBr) ₂	215.83	-19.5	101.4		
86	C ₂ Br ₄	Tetrabromoethylene Br ₂ C≡CBr ₂	343.66	57.5	227		
87	C ₂ Br ₆	Hexabromoethane Br ₃ C≡CBr ₃	503.50		210	3.823	1316
88	C ₂ Cl ₂	Dichloroacetylene ClC≡CCl	91.916	-50			
89	C ₂ Cl ₂ O ₂	Oxalyl chloride (COCl) ₂	126.916	-12	64	1.488 ^{11, 4}	822
90	C ₂ Cl ₄	Tetrachloroethylene Cl ₂ C≡CCl ₂	165.83	22.4	120.8	1.623	623
91	C ₂ Cl ₄ O ₂	Trichloromethyl chloroformate	197.83	-57	127.5	1.653 ¹⁴	
92	C ₂ Cl ₆	Hexachloroethane Cl ₃ CCl ₃	236.75	185	185	2.091	
93	C ₂ I ₂	Diiodoacetylene IC≡CI	277.86	82			
94	C ₂ I ₄	Tetraiodoethylene I ₂ C≡CI ₂	531.73	187		2.983	
95	C ₂ N ₂	Cyanogen CN·CN	52.016	-34.4	-20.5	0.866 ^{17, 2}	
96	C ₂ N ₂ S	Cyanogen sulfide (CN) ₂ S	84.081	60			
97	C ₂ N ₂ O ₆	Trinitroacetomtrile	176.03	41.5	exp. 220		
98	C ₂ N ₂ O ₁₂	Hexanitroethane (O ₂ N) ₃ CC(NO ₂) ₃	300.05	142 d.			
99	C ₂ HBr	Bromoacetylene BrC≡CH	104.924		-2		
100	C ₂ HBrCl ₂	1, 2-Dichloro-1-bromoethylene	175.84	-83.5	113.8	1.913 ¹⁴	867
101	C ₂ HBr ₃	Tribromoethylene Br ₃ C≡CHBr	264.76		164	2.708	778
102	C ₂ HBr ₂ Cl ₂	1, 2, 2-Tribromo-1, 2-dichloroethane	335.67	6	112 ¹⁶	2.635 ¹⁴	781
103	C ₂ HBr ₂ O	Bromal Br ₂ CCHO	280.76		174	2.30 ¹⁵	
104	C ₂ HBr ₂ O ₂	Tribromoacetic acid Br ₃ CCO ₂ H	296.76	130	245 d.		
105	C ₂ HBr ₃	Pentabromoethane Br ₃ CCHBr ₂	424.59	57	210 ¹⁰⁰	3.312	
106	C ₂ HCl ₃	Trichloroethylene Cl ₂ C=CHCl	131.38	-86.4	88	1.477	525
107	C ₂ HCl ₃ O	Chloral Cl ₃ CCHO	147.38	-57.5	98.1	1.512	455
108	C ₂ HCl ₃ O	Dichloroacetyl chloride Cl ₂ CHCOCl	147.38		108		
109	C ₂ HCl ₃ O ₂	Trichloroacetic acid Cl ₃ CCO ₂ H	163.38	57.5	195.3	1.617 ¹⁴	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
110	$C_2HCl_3O_2$	Dichloromethyl chloroformate	163.38		116	1.558 ¹⁴	
111	C_2HCl_3	Pentachloroethane Cl_5CCHCl_2	202.298	-29.0	162	1.709 ²	614
112	C_2HF_3	Trifluoroethylene	82.008		-51	1.26 ⁻⁷⁸	
112	$C_2HF_3O_2$	Trifluoroacetic acid F_3CCO_2H	114.01	-15.6	72.5	1.535 ⁹	
113	C_2HI	Iodoacetylene IC_2CH	151.94		32		
114	$C_2HI_3O_2$	Triiodoacetic acid I_3CCO_2H	437.80	150 d.			
115	C_2H_3	Acetylene HC_2CH	26.015	-81.8	-83.6	Liq. 0 613 ⁻⁸⁰ Sol. 0.730 ⁻⁸⁵	
116	$C_2H_2AsCl_2$	2-Chlorovinylarsine dichloride	207.35		190	1.888	
117	C_2H_2BrCl	<i>cis</i> -1-Bromo-2-chloroethylene	141.39		84.7	1.797 ¹⁵	863
118	C_2H_2BrCl	<i>trans</i> -1-Bromo-2-chloroethylene	141.39	41	75.4	1.777 ¹⁵	864
119	C_2H_2BrCO	Chloroacetyl bromide $ClCH_2COBr$	157.39		135	1.913 ⁹	
120	$C_2H_2BrCO_2$	Bromochloroacetic acid $BrClCHCO_2H$	183.39	23.8	211.7 s. d.	1.985 ³⁰	
121	$C_2H_2BrCl_2$	1-Bromo-1, 2, 2-trichloroethane	212.31	-21	104.1	2.0554 ⁹	
122	$C_2H_2Br_2$	1, 1-Acetylene dibromide $CH_2:CBBr_2$	185.85		92	2.178	
123	$C_2H_2Br_2$	1, 2-Acetylene dibromide $BrCH:CHBr$	185.85		110.2	2.256	719
124	$C_2H_2Br_2O$	Bromoacetyl bromide $BrCH_2COBr$	201.85		150	2.317 ²¹	
125	$C_2H_2Br_2O_2$	Dibromoacetic acid Br_2CHCO_2H	217.85	48	232		
126	$C_2H_2Br_3Cl$	1, 2, 2-Tribromo-1-chloroethane	301.22	20.6	220 d.	2.652 ¹⁴	780
127	$C_2H_2Br_4$	1, 1, 1, 2-Tetrabromoethane $BrCH_2CBr_3$	345.68	0.0	103.5 ¹³	2.875	794
128	$C_2H_2Br_4$	1, 1, 2, 2-Tetrabromoethane	345.68	0.1	151 ¹⁴	2.964	796
129	$C_2H_2ClHO_2$	Chloriodoacetic acid $ClCH_2CO_2H$	220.41	90			
130	C_2H_2ClNO	Chloromethyl isocyanate $ClCH_2CNO$	91.481		81		
132	$C_2H_2Cl_2$	<i>cis</i> -1, 2-Acetylene dichloride	96.931	-50.0	48.4	1.265 ¹⁵	853
133	$C_2H_2Cl_2$	<i>trans</i> -1, 2-Acetylene dichloride	96.931	-80.5	60.3	1.291 ¹⁵	854
134	$C_2H_2Cl_2O$	Dichloroacetaldehyde Cl_2CHCHO	112.931		90.5		
135	$C_2H_2Cl_2O_2$	Chloroacetyl chloride $ClCH_2COCl$	112.931		105	1.495 ⁹	
136	$C_2H_2Cl_2O_2$	Dichloroacetic acid Cl_2CHCO_2H	128.931	10; -4	193.5	1.563	490
137	$C_2H_2Cl_2O_2$	Chloromethyl chloroformate	128.931		108	1.516	
138	$C_2H_2Cl_2NO$	Trichloroacetamide Cl_3CCONH_2	162.40	141	240		
139	$C_2H_2Cl_4$	1, 1, 1, 2-Tetrachloroethane	167.85		130.5	1.588	528
140	$C_2H_2Cl_4$	1, 1, 2, 2-Tetrachloroethane	167.85	-43.8	146.3	1.600	567
141	$C_2H_2F_2O_2$	Diffuoroacetic acid F_2CHCO_2H	96.015	-0.35	134.2 ⁹⁹	1.526	4
142	$C_2H_2F_2NO$	Trifluoroacetamide F_3CCONH_2	113.023	74.8	162.5		
143	$C_2H_2I_2O_2$	Diiodoacetic acid I_2CHCO_2H	311.88	110			
144	$C_2H_2N_4$	1, 2, 4, 5-Tetrazine	82.047	99			
145	C_2H_2O	Ketene $CH_2=C=O$	42.015	-151	-56		
146	$C_2H_2O_2$	Glyoxal $CHO:CHO$	58.015	15	50.4	1.14	46
147	$C_2H_2O_4$	Oxalic acid HO_2CCO_2H	90.015	189		2	1194
148	C_2H_2Br	Vinyl bromide $CH_2=CHBr$	106.939	-137.8	15.8	1.517 ¹⁴	415
149	C_2H_2BrO	Acetyl bromide CH_3COBr	122.939	-96.5	76.7	1.52 ⁵	
150	$C_2H_2BrO_2$	Bromoacetic acid CH_2BrCO_2H	138.939	50	208	1.934	
151	$C_2H_2Br_4$	1, 1, 2-Tribromoethane $BrCH_2CHBr_2$	266.77	-26	188.4	2.579	773
152	$C_2H_2Br_4O$	Tribromoethyl alcohol Br_3CCH_2OH	282.77	80	94 ¹¹		
152	$C_2H_2Br_4O_2$	Bromal hydrate	298.77	53			1333
153	C_2H_2Cl	Vinyl chloride $CH_2=CHCl$	62.481		-15		
154	C_2H_2ClO	Acetyl chloride CH_3COCl	78.481	-112.0	52	1.104	76
155	$C_2H_2ClO_2$	Methyl chloroformate $ClCO_2CH_3$	94.481		71.4	1.236 ¹⁵	
156	$C_2H_2ClO_2$	Chloroacetic acid CH_2ClCO_2H	94.481	α 61.2 β 56.3 γ 50.1 δ 43.8 (?)	189.5	1.370 ¹⁵	1099
157	$C_2H_2Cl_2NO$	Dichloroacetamide $Cl_2CHCONH_2$	127.947	98	234.6		
158	$C_2H_2Cl_3$	1, 1, 1-Trichloroethane CH_3CCl_3	133.397		74.1	1.334	350
159	$C_2H_2Cl_3$	1, 1, 2-Trichloroethane $ClCH_2CHCl_2$	133.397	-36.7	113.5	1.443	506
160	$C_2H_2Cl_3O$	Trichloroethyl alcohol Cl_3CCH_2OH	149.397	17.8	152.2	1.550 ²²	
161	$C_2H_2Cl_3O_2$	Chloral hydrate $Cl_3CCH(OH)_2$	183.41	47.4	98 d.	1.908	1258
162	C_2H_2FO	Acetyl fluoride CH_3COF	62.023	> -60	20.5	0.993 ²⁰	
163	$C_2H_2FO_2$	Fluoroacetic acid CH_2FCO_2H	78.023	33	165		
164	C_2H_2I	Vinyl iodide $CH_2=CHI$	153.96		56	2.08 ⁹	
165	C_2H_2IO	Iodoacetaldehyde $CH_2ICH=O$	169.96		80 d.		
166	C_2H_2IO	Acetyl iodide CH_3COI	169.96		108	1.98 ¹⁷	
167	$C_2H_2IO_2$	Iodoacetic acid ICH_2CO_2H	185.96	82			

C-TABLE: C₂H₄ TO C₇H₄

179

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
168	C ₂ H ₃ N	Acetonitrile CH ₃ CN	41.031	-41	82	0.783	6
169	C ₂ H ₃ N	Methyl isocyanide CH ₃ NC	41.031	-45	59.6	0.756 ⁴	
170	C ₂ H ₃ NO	Glycolic nitrile HOCH ₂ CN	57.031		183	1.104	952
172	C ₂ H ₃ NO	Methyl isocyanate CH ₃ N:CO	57.031		43		
173	C ₂ H ₃ NO ₂	Nitroethylene CH ₂ :CHNO ₂	73.031		98.5	1.073 ¹²	
174	C ₂ H ₃ NO ₂	Oxamic acid HO ₂ CCONH ₂	89.031	210 d.			
175	C ₂ H ₃ NO ₂	Nitroacetic acid O ₂ NCH ₂ CO ₂ H	105.03	89			
176	C ₂ H ₃ NS	Methyl thiocyanate CH ₃ CNS	73.096	-51	133	1.068	501
177	C ₂ H ₃ NS	Methyl isothiocyanate CH ₃ N:CS	73.096	35	119	1.009 ¹⁷	1052
178	C ₂ H ₃ N ₃	1, 2, 4-Triazole.....	69.047	121	260		
179	C ₂ H ₃ N ₃ O ₄	1, 1, 1-Trinitroethane (O ₂ N) ₃ CCH ₃	165.05	56			
180	C ₂ H ₄	Ethylene H ₂ C:CH ₂	28.0308	-169.4	103.8	0.566 ¹⁰³	
181	C ₂ H ₄ BrCl	1-Bromo-2-chloroethane ClCH ₂ CH ₂ Br	143.405	-16.6	103.7	1.79 ⁹	
182	C ₂ H ₄ BrNO	Acetobromamide CH ₃ CONHBr	137.96	108			
183	C ₂ H ₄ Br ₂	1, 1-Dibromoethane CH ₃ CHBr ₂	187.86		110	2.056	647
184	C ₂ H ₄ Br ₂	Ethylene bromide BrCH ₂ CH ₂ Br	187.86	10.0	131.7	2.182	710
185	C ₂ H ₄ Br ₂ O	Dibromoethyl alcohol Br ₂ CHCH ₂ OH	203.86		181	2.35 ⁹	
186	C ₂ H ₄ Br ₂ O	<i>sym.</i> -Dibromomethyl ether (BrCH ₂) ₂ O	203.86	-34	155	2.201	
187	C ₂ H ₄ ClNO	Acetochloroamide CH ₃ CONHCl	93.497	110			
188	C ₂ H ₄ ClNO	Chloroacetamide ClCH ₂ CONH ₂	93.497	119.5	225.6		
189	C ₂ H ₄ Cl ₂	1, 1-Dichloroethane CH ₃ CHCl ₂	98.947	-96.7	57.3	1.174	227
190	C ₂ H ₄ Cl ₂	Ethylene chloride ClCH ₂ CH ₂ Cl	98.947	-35.3	83.7	1.257	400
191	C ₂ H ₄ Cl ₂ O	Dichloroethyl alcohol Cl ₂ CHCH ₂ OH	114.947		146	1.145 ¹⁸	
192	C ₂ H ₄ Cl ₂ O	<i>sym.</i> -Dichloromethyl ether (ClCH ₂) ₂ O	114.947		106	1.315	349
193	C ₂ H ₄ Cl ₂ OS	Di-(chloromethyl) sulfoxide	117.01	40			
194	C ₂ H ₄ Cl ₂ S	<i>sym.</i> -Dichloromethyl sulfide	131.012		58.5 ¹⁴	1.114 ¹⁴	
195	C ₂ H ₄ Cl ₂ NO	Chloral ammonia Cl ₂ CCHO.NH ₃	104.41	74	100 d.		
196	C ₂ H ₄ I ₂	1, 1-Diodoethane CH ₃ CHI ₂	281.9		179	2.84 ⁶	
197	C ₂ H ₄ I ₂	Ethylene iodide ICH ₂ CH ₂ I	281.9	82	d.	2.132 ¹⁰	
199	C ₂ H ₄ N ₂ O ₂	Oxamide H ₂ NOC(=O)NH ₂	88.047	419 d.		1.067	
200	C ₂ H ₄ N ₂ O ₂	Glyoxime NOH:CHCH:NOH	88.017	178			
201	C ₂ H ₄ N ₂ O ₂	Ethyl nitrolic acid CH ₃ C(NO ₂) ₂ NOH	104.047	88	d.		
202	C ₂ H ₄ N ₂ O ₄	1, 1-Dinitroethane CH ₃ CH(NO ₂) ₂	120.047		186	1.350 ²³	
203	C ₂ H ₄ N ₂ O ₄	Ethylene dinitrite ONOCH ₂ CH ₂ ONO	120.047	37.5	98	1.216 ⁹	
204	C ₂ H ₄ N ₂ O ₄	Ethylene nitrite nitrate	136.047	d.		1.472	
205	C ₂ H ₄ N ₂ O ₄	Dinitroglycol (CH ₂ ONO ₂) ₂	152.047	-20	exp. 116	1.406 ¹⁸	
207	C ₂ H ₄ N ₄	Dieryandiamide H ₂ NC(=NH)NHCN	84.063	207			
208	C ₂ H ₄ O	Acetaldehyde CH ₃ CHO	44.031	-123.5	20.2	0.781	3
209	C ₂ H ₄ O	Ethylene oxide	44.031	-111.3	10.7	0.887 ⁷	803
210	C ₂ H ₄ OS	Thioacetic acid CH ₃ COSH	76.096	< -17	93	1.074 ¹⁰	
211	C ₂ H ₄ O ₂	Glycollic aldehyde HOCH ₂ CHO	60.031	9 ⁷			
212	C ₂ H ₄ O ₂	Acetic acid CH ₃ CO ₂ H	60.031	16.6	118.1	1.049	26
213	C ₂ H ₄ O ₂	Methyl formate HCO ₂ CH ₃	60.031	-99.8	31.8	0.975	5
214	C ₂ H ₄ O ₂	Glycollic acid HOCH ₂ CO ₂ H	76.031	{ α63.0 β79			
215	C ₂ H ₄ O ₂	Methyl acid carbonate CH ₃ HCO ₃	76.031	-57			
216	C ₂ H ₄ O ₂	Ethylene ozonide	76.031		18 ¹⁸		
217	C ₂ H ₄ O ₂ S	Sulfoacetic acid HO ₂ SCH ₂ CO ₂ H	140.10	86			
218	C ₂ H ₄ S	Ethylene sulfide.....	60.096		55	1.034	
219	C ₂ H ₄ AsO ₄	Arsonoacetic acid (OH) ₂ AsOCH ₂ COOH	184.00	152			
220	C ₂ H ₄ Br	Ethyl bromide.....	108.955	-119.0	38.0	1.430	275
221	C ₂ H ₄ BrO	2-Bromoethyl alcohol BrCH ₂ CH ₂ OH	124.955		150.3	1.685	555
222	C ₂ H ₄ BrO	Bromomethyl methyl ether	124.955		87	1.531 ¹²	458
224	C ₂ H ₄ Cl	Ethyl chloride	64.497	-138.7	12.2	0.910	
225	C ₂ H ₄ ClO ₂ S	Chloromethyl methyl sulfate	160.56		92 ¹⁸	1.473	
226	C ₂ H ₄ Cl ₂ N	Ethyl dichloramine C ₂ H ₅ NC ₂	113.963		89		
227	C ₂ H ₄ ClO	2-Chloroethyl alcohol ClCH ₂ CH ₂ OH	80.497	-69.0	128.8	1.213	
228	C ₂ H ₄ ClO	Chloromethyl methyl ether	80.497		59.5	1.063 ¹⁰	107
229	C ₂ H ₄ ClO	Ethyl hypochlorite	80.497		36.6		
230	C ₂ H ₄ ClO ₂ S	Ethylsulfone chloride CH ₃ CH ₂ SO ₂ Cl	128.562		177.5	1.357	
231	C ₂ H ₄ ClO ₄	Ethyl perchlorate	128.497		74		
232	C ₂ H ₄ F	Ethyl fluoride	48.039	-32		1.7	
233	C ₂ H ₄ FO	2-Fluoroethyl alcohol FCH ₂ CH ₂ OH	64.039	-28.5	103.4	1.114	21

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
234	C ₂ H ₅ I	Ethyl iodide	155.97	-108.5	72.2	1.933	644
235	C ₂ H ₅ IO	2-Iodoethyl alcohol CH ₃ CH ₂ OH	171.97		177 s. d.	2.905	
236	C ₂ H ₅ IO	Iodomethyl methyl ether CH ₃ OCH ₂ I	171.97		125	2.025 ¹⁴	728
237	C ₂ H ₅ N	Vinylamine H ₂ C=CHNH ₂	43.047		56	0.832	
238	C ₂ H ₅ NO	Acetamide CH ₃ CONH ₂	59.047	81.0 69.4	222	1.159	1107, 1173, 1198 1070
239	C ₂ H ₅ NO	Acetaldoxime CH ₃ CH=NOH	59.047	47	115	0.966	
240	C ₂ H ₅ NO ₂	Acetohydroxamic acid CH ₃ CONHOH	75.047	88		1.161	1274
241	C ₂ H ₅ NO ₂	Ammonoacetic acid H ₂ NCH ₂ CO ₂ H	75.047	233 d.		1.056 ¹⁵	84
242	C ₂ H ₅ NO ₂	Nitroethane CH ₃ CH ₂ NO ₂	75.047	< -50	114.8	0.900 ¹⁵	
243	C ₂ H ₅ NO ₂	Ethyl nitrite CH ₃ CH ₂ ONO	75.047		17		
244	C ₂ H ₅ NO ₂	Methyl carbamate CH ₃ CONH ₂	75.047	52	177		
245	C ₂ H ₅ NO ₂	Glycollicamide HOCH ₂ CONH ₂	75.047	120			
246	C ₂ H ₅ NO ₂	Nitroethyl alcohol O ₂ NCH ₂ CH ₂ OH	91.047	< -80	193.8	1.270 ¹⁴	
247	C ₂ H ₅ NO ₂	Ethyl nitrate CH ₃ CH ₂ ONO ₂	91.047	-102.0	88.7	1.105	54
248	C ₂ H ₅ NO ₂ (H ₂ O)	Ammonium hydrogen oxalate	107.047			1.556	
249	C ₂ H ₅ NO ₂	Nitroglycol HOCH ₂ CH ₂ NO ₂	107.047	d.		1.31 ¹¹	
250	C ₂ H ₅ NS	Thioacetamide CH ₃ CSNH ₂	75.112	108.5			
251	C ₂ H ₅ N ₂ O ₂	Buret NH(CONH ₂) ₂	103.063	193			
252	C ₂ H ₅	Ethane CH ₃ CH ₃	30.062	-172.0	-88.3	0.546 ¹⁸	
253	C ₂ H ₅ AsBr	Cacodyl bromide (CH ₃) ₂ AsBr	184.92		130		
254	C ₂ H ₅ AsCl	Cacodyl chloride (CH ₃) ₂ AsCl	140.464		106.5	> 1	
255	C ₂ H ₅ AsCl ₂	Cacodyl trichloride (CH ₃) ₂ AsCl ₂	211.38	50 d.			
256	C ₂ H ₅ AsI	Cacodyl iodide (CH ₃) ₂ AsI	231.94		160		
257	C ₂ H ₅ NO	Ammonoacetamide H ₂ NCH ₂ CONH ₂	74.06	65			
258	C ₂ H ₅ N ₂ O	Dimethylnitrosamine (CH ₃) ₂ NNO	74.062		152.5	1.003	356
259	C ₂ H ₅ N ₂ O	N-Methylurea CH ₃ NHCONH ₂	74.062	101		1.204	
260	C ₂ H ₅ N ₂ O ₂	Oxalyl dihydrazide (CONHNH ₂) ₂	118.08	235 d.			
261	C ₂ H ₅ N ₂ S	Guandine thiocyanate	118.143	118			
262	C ₂ H ₅ O	Ethyl alcohol C ₂ H ₅ OH	46.046	-117.3	78.5	0.789	17
263	C ₂ H ₅ O	Methyl ether CH ₃ OCH ₃	46.046	-138.0	-24.9	1.617	
264	C ₂ H ₅ O ₂	Glycol HOCH ₂ CH ₂ OH	62.046	-17.4	197.5	1.115	305
265	C ₂ H ₅ O ₂ S	Dimethyl sulfone (CH ₃) ₂ SO ₂	94.111	193	238		
266	C ₂ H ₅ O ₂ S	Methyl sulfite (CH ₃) ₂ SO ₃	110.111		126.5	1.046	
267	C ₂ H ₅ O ₂	Acetyl peroxide (CH ₃ CO) ₂ O ₂	94.046	30	63 ²¹		
268	C ₂ H ₅ O ₂ S	Ethylsulfonic acid C ₂ H ₅ SO ₃ H	126.111		d.	1.316 ¹⁷	
269	C ₂ H ₅ O ₂ S	Methyl sulfate (CH ₃) ₂ SO ₄	126.111	-31.8	188.8	1.333 ¹⁸	66
270	C ₂ H ₅ O ₄	Oxalic acid dihydrate	126.046	101.5		1.64	1206
271	C ₂ H ₅ O ₂ Se	Ethane-1, 2-disulfonic acid	190.18	104			
272	C ₂ H ₅ S	Methyl sulfide (CH ₃) ₂ S	62.111	-83.2	36.2	0.849	
273	C ₂ H ₅ S	Ethylmercaptan C ₂ H ₅ SH	62.111	-121.0	34.7	0.840	323
274	C ₂ H ₅ S ₂	Methyl disulfide CH ₃ SSCH ₃	94.176		118	1.046	
275	C ₂ H ₅ S ₂	Ethylmercaptan HSCH ₂ CH ₂ SH	94.176		146	1.123	
276	C ₂ H ₅ Se	Ethylhydroselenide C ₂ H ₅ SeH	109.246		53.5	1.395	
277	C ₂ H ₅ Te	Methyl telluride (CH ₃) ₂ Te	157.546		82		
278	C ₂ H ₅ As	Dimethylarsine (CH ₃) ₂ AsH	106.014		36	1.213 ²⁰	
279	C ₂ H ₅ As	Ethylarsine C ₂ H ₅ AsH ₂	106.014		36	1.217	
280	C ₂ H ₅ AsO ₂	Cacodylic acid (CH ₃) ₂ AsO.OH	138.014	200			
281	C ₂ H ₅ AsO ₂	Ethylarsonic acid C ₂ H ₅ AsO(OH) ₂	154.014	95			
282	C ₂ H ₅ N	Dimethylamine (CH ₃) ₂ NH	45.062	-96.0	7.4	0.680 ²²	
283	C ₂ H ₅ N	Ethylamine C ₂ H ₅ NH ₂	45.062	-80.6	16.6	0.689 ²³	
284	C ₂ H ₅ NO	Acetaldehyde ammonia CH ₃ CHO.NH ₂	61.062	97	110 s. d.		1333
285	C ₂ H ₅ NO	2-Aminoethyl alcohol H ₂ NCH ₂ CH ₂ OH	61.062		171	1.022 ²⁰	446
286	C ₂ H ₅ NO	Dimethylhydroxylamine (CH ₃) ₂ NOH	61.062		42.4		
287	C ₂ H ₅ NO	α-Ethylhydroxylamine NH ₂ OC ₂ H ₅	61.062		68	0.8837 ²⁴	
288	C ₂ H ₅ NO	β-Ethylhydroxylamine C ₂ H ₅ NHOH	61.062	59 d.		0.908	1098
289	C ₂ H ₅ NO ₂	Ammonium acetate CH ₃ CO ₂ NH ₄	77.062	114		1.073	
290	C ₂ H ₅ NO ₂ S	Taurine H ₂ NCH ₂ CH ₂ SO ₃ H	125.127	88			
290 1	C ₂ H ₅ N ₂	Diazoammonioethane C ₂ H ₅ N.N.NH ₂	73.08	-12	92 s. d.		
291	C ₂ H ₅ N ₂ O ₄	Methylurea nitrate	137.08	128			
292	C ₂ H ₅ O ₃ P	Dimethylphosphinic acid (CH ₃) ₂ PO.OH	94.08	76			
293	C ₂ H ₅ O ₃ P	Ethylphosphinic acid C ₂ H ₅ PO(OH) ₂	110.08	44			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
294	C ₂ H ₂ P	Dimethylphosphine (CH ₃) ₂ PH	62.078		25		
295	C ₂ H ₂ P	Ethylphosphine C ₂ H ₅ PH ₂	62.078		25	< 1	
296	C ₂ H ₅ BrN	Ethylamine hydrobromide	125.986	159.5		1.741	
297	C ₂ H ₅ ClN	Dimethylamine hydrochloride	81.528	171			
298	C ₂ H ₅ ClN	Ethylamine hydrochloride	81.528	109		1.216	
299	C ₂ H ₅ IN	Ethylamine hydroiodide C ₂ H ₅ NH ₂ ·HI	173.00	188.5		2.100	
300	C ₂ H ₅ N ₂	Ethylenediamine H ₂ NCH ₂ CH ₂ NH ₂	60.078	8.5	117	0.892 ¹⁶	1032
301	C ₂ H ₅ N ₂	<i>unsym.</i> -Dimethylhydrazine	60.078		61	0.794	987
302	C ₂ H ₅ N ₂	Ethylhydrazine C ₂ H ₅ NHNH ₂	60.078		101.5		
303	C ₂ H ₅ N ₂ O ₄ (H ₂ O)	Ammonium oxalate	124.078			1.501	1233
304	C ₂ H ₅ N ₄	Ethyltetrazine	88.094	< 20	140 d.		
305	C ₂ H ₅ N ₄ O ₃	Methylguanidine nitrate	136.09	150			
306	C ₂ H ₅ Cl ₂ N ₂	Ethylenediamine hydrochloride	133.01				1284
307	C ₂ H ₅ N ₂ O	Ethylenediamine hydrate	78.093	10	118	0.963	433
308	C ₂ H ₅ N ₄ O ₄ S	Aminoguanidine sulfate	216.24	161			
308 1	C ₂ Cl ₂ N ₄	Cyanuric trichloride	184.40	146		1.32	
309	C ₂ Cl ₄	Octachloropropane Cl ₃ CCCl ₂ CCl ₃	319.66	160	269		
310	C ₂ O ₂	Carbon suboxide OC≡C:CO	68.00	-107	6.3	1.114 ⁹	802
311	C ₂ HCl ₃ O ₂	Trichloroacrylic acid Cl ₂ C=CClCO ₂ H	175.38	72.9	223		
312	C ₂ HCl ₃ O	Heptachloropropane Cl ₂ CHCCl ₂ CCl ₂	285.21	30	248	1.805 ¹⁴	
313	C ₂ HN	Cyanoacetylene HC≡CCN	51.016	5	42.5	0.816	911
313 1	C ₂ H ₂ Br ₂ N ₂ O	Dibromocyanacetamide	245.86	123		2.375	
314	C ₂ H ₂ Cl ₂ O ₂	Malonyl chloride H ₂ C(COCl) ₂	140.93		58 ¹⁶	1.450	1009
315	C ₂ H ₂ Cl ₂ NO	2, 2, 2-Trichlorolactic nitrile	174.40	61	220		
316	C ₂ H ₂ N ₂	Malonic nitrile H ₂ C(CN) ₂	66.031	32.1	220	1.010 ¹⁴	1042
317	C ₂ H ₂ N ₂ O ₄	Parabanic acid CO<(NHCO) ₂ >	114.031	227 d.			1333
318	C ₂ H ₂ O	Propargyl aldehyde HC≡CCHO	54.015		61		
319	C ₂ H ₂ O ₂	Propiolic acid HC≡C·CO ₂ H	70.015	9	144 d.	1.139 ¹⁵	
320	C ₂ H ₂ Br ₂ O ₂	1-Bromoacrylic acid CH ₂ =CBrCO ₂ H	150.94	70			
321	C ₂ H ₂ Br ₂ O ₂	2-Bromoacrylic acid BrCH=CHCO ₂ H	150.94	116			
322	C ₂ H ₂ Br ₂ O	Bromomalonic acid BrCH(CO ₂ H) ₂	182.94	112 d.			
323	C ₂ H ₂ Cl	3-Chloroallylene ClCH ₂ CCCH ₂	74.481		65	1.045 ⁸	
323 1	C ₂ H ₂ ClO	Acryl chloride H ₂ C=CHCOCl	90.481		76	1.14 ⁹	
324	C ₂ H ₂ ClO ₂	1-Chloroacrylic acid CH ₂ =CClCO ₂ H	106.48	65			
325	C ₂ H ₂ ClO ₂	2-Chloroacrylic acid ClCH=CHCO ₂ H	106.48	85			
326	C ₂ H ₂ ClO ₄	Chloromalonic acid ClCH(CO ₂ H) ₂	138.48	133			
327	C ₂ H ₂ Cl ₃ O	1, 1, 1-Trichloroacetone CH ₃ COCCl ₃	161.40		149		
328	C ₂ H ₂ Cl ₃ O	1, 1, 1'-Trichloroacetone	161.40		172		
329	C ₂ H ₂ Cl ₃ O ₂	Methyl trichloroacetate CH ₃ COO ₂ CCl ₃	177.40	-17.5	153.8	1.489 ¹¹	
330	C ₂ H ₂ Cl ₃ O ₂	2, 2, 2-Trichlorolactic acid	193.40	124	170 ¹⁶		
331	C ₂ H ₂ Cl ₃	Pentachloropropane	216.31		198	1.607 ¹⁴	645
332	C ₂ H ₂ N	Acrylic nitrile CH ₂ =CHCN	53.031	-82.0	79		
332 1	C ₂ H ₂ NO	Pyruvic nitrile CH ₃ COCN	69.04		93		
333	C ₂ H ₂ NO ₂	Cyanoacetic acid NCCH ₂ CO ₂ H	85.031	66	108 ⁹	1.108	
334	C ₂ H ₂ NS	Thiazole	85.096		116.8		1333
335	C ₂ H ₂ N ₂ O ₃	Cyanuric acid	129.047	> 360			
336	C ₂ H ₂ N ₂ O ₃	Fulminuric acid (CNOH) ₂	129.05	145 d.			
337	C ₂ H ₄	Allene H ₂ C=C=CH ₂	40.031	-146	-32		
338	C ₂ H ₄	Allylene HC≡CCH ₂	40.031	-104.7	-27.5	0.660 ⁻¹²	
339	C ₂ H ₄ Br ₂	<i>cis</i> -1, 2-Dibromopropylene	199.86		135.2	2.024	924
340	C ₂ H ₄ Br ₂	<i>trans</i> -1, 2-Dibromopropylene	199.86		126	2.024	925
341	C ₂ H ₄ Br ₂	2, 3-Dibromopropylene	199.86		142.3	1.934	
342	C ₂ H ₄ Br ₂ O ₂	1, 1-Dibromopropionic acid	231.86	61	221		
343	C ₂ H ₄ Br ₂ O ₂	1, 2-Dibromopropionic acid	231.86	64; 51	160 ²⁰		
344	C ₂ H ₄ Br ₄	1, 1, 2, 2-Tetrabromopropene	359.69		230 s. d.	2.94 ⁹	
345	C ₂ H ₄ Br ₄	1, 2, 2, 3-Tetrabromopropene	359.69	11	230 d.	2.652 ¹⁸	
346	C ₂ H ₄ Cl ₂ O	<i>sym.</i> -Dichloroacetone (ClCH ₂) ₂ CO	126.947	45	173.4	1.383 ¹⁶	
347	C ₂ H ₄ Cl ₂ O	<i>unsym.</i> -Dichloroacetone	126.947		120	1.234 ¹⁶	
348	C ₂ H ₄ Cl ₂ O ₂	2, 2-Dichloropropionic acid	142.947	56	190		
349	C ₂ H ₄ Cl ₂ NO ₂	Chloral formamide Cl ₂ CH·CHO·HCONH ₂	192.41	116			
350	C ₂ H ₄ N ₂	Imidazole	68.047	90	256		
351	C ₂ H ₄ N ₂	Pyrazole	68.047	70	188		
352	C ₂ H ₄ N ₂ O	Cyanoacetamide NCCH ₂ CONH ₂	84.047	120			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
353	$C_3H_4N_2O$	Pyrazolone — $NHCOCH_2CH=N$ —	84.047	165			
354	$C_3H_4N_2O_2$	Hydantoin — $NHCONHCH_2CO$ —	100.047	220			
355	C_3H_4O	Propargyl alcohol $HC\equiv CCH_2OH$	56.031	-17	115	0.972	324
356	C_3H_4O	Acrolein $H_2C=CH\cdot CHO$	56.031	-87.7	52.5	0.841	119
357	C_3H_4O	Allylene oxide	56.031		63		
358	$C_3H_4O_2$	Acrylic acid $H_2C=CHCO_2H$	72.031	12.3	141.9	1.051	264
359	$C_3H_4O_2$	Pyruvic acid CH_3COCO_2H	88.031	13.6	165	1.267	873
360	$C_3H_4O_4$	Malonic acid $CH_2(CO_2H)_2$	104.031	135.6			
361	$C_3H_4O_4$	Methyl hydrogen oxalate	104.031	54	163.3	1.422 ²⁴	1191
362	$C_3H_4O_4$	Tartronic acid $HOCH(CO_2H)_2$	120.031	158 d.			1333
363	$C_3H_4O_4$	Mesoxalic acid $(HO)_2C(CO_2H)_2$	136.03	121			
364	C_3H_5Br	1-Bromopropylene $CH_3CH=CHBr$	120.955	-116.6	60.2	1.428 ^{19,6}	452
365	C_3H_5Br	2-Bromopropylene $CH_3CBr=CH_2$	120.955	-124.8	48.4	1.362 ²⁰	
366	C_3H_5Br	3-Bromopropylene $BrCH_2CH=CH_2$	120.955	-119.4	71.3	1.398	489
367	C_3H_5BrO	Bromoacetone CH_3COCH_2Br	136.955	-54	127	1.603	
368	$C_3H_5BrO_2$	dl-1-Bromopropionic acid	152.955	25.7	203.5	1.700	522
369	$C_3H_5BrO_2$	2-Bromopropionic acid	152.96	61			
370	$C_3H_5Br_3$	1, 1, 2-Tribromopropane	280.79		201	2.356	
371	$C_3H_5Br_3$	1, 2, 2-Tribromopropane	280.79		191	2.33 ¹²	
372	$C_3H_5Br_3$	1, 2, 3-Tribromopropane	280.79	17	222	2.436 ²¹	767
373	C_3H_5Cl	1-Chloropropylene $CH_3CH=CHCl$	76.497		36		
374	C_3H_5Cl	2-Chloropropylene $CH_3CCl=CH_2$	76.497	-137.4	22.7	0.931 ⁶	
375	C_3H_5Cl	3-Chloropropylene $ClCH_2CH=CH_2$	76.497	-136.4	44.6	0.938	222
376	$C_3H_5ClN_2O_6$	Chlorodinitrohydrin	200.51	6.8	123 ¹⁵	1.54 ¹⁵	
377	C_3H_5ClO	Chloroacetone CH_3COCH_2Cl	92.497	-44.5	121	1.162 ¹⁶	
378	C_3H_5ClO	Propionyl chloride C_2H_5COCl	92.497	-94.0	80	1.065	152
379	C_3H_5ClO	α -Epichlorohydrin	92.497	-25.6	117	1.184	895
380	$C_3H_5ClO_2$	Chloroacetyl carbinol	108.497	74 d.			
381	$C_3H_5ClO_2$	1-Chloropropionic acid	108.497		186	1.306 ⁹	
382	$C_3H_5ClO_2$	2-Chloropropionic acid	108.497	61	204		
383	$C_3H_5ClO_2$	Ethyl chloroformate $ClCO_2C_2H_5$	108.497	-80.6	95	1.139 ^{15,1}	
384	$C_3H_5ClO_2$	Methyl chloroacetate $ClCH_2CO_2CH_3$	108.497	-32.7	131.5	1.22	
385	$C_3H_5Cl_3$	1, 1, 2-Trichloropropane	147.413		137	1.372 ²⁵	
386	$C_3H_5Cl_3$	1, 1, 3-Trichloropropane	147.413		148	1.362 ¹⁶	
387	$C_3H_5Cl_3$	1, 2, 2-Trichloropropane	147.413		123	1.318 ²⁶	
388	$C_3H_5Cl_3$	1, 2, 3-Trichloropropane	147.413	-14.7	156	1.417 ¹⁶	
389	$C_3H_5Cl_3O$	1, 1, 1-Trichloroisopropyl alcohol	163.413	50	161.3		
390	C_3H_5I	2-Iodopropylene $CH_3CI=CH_2$	167.97		103	1.835	
391	C_3H_5I	3-Iodopropylene $ICH_2CH=CH_2$	167.97	-99.3	103.1	1.848 ^{17,1}	
392	C_3H_5IO	Iodoacetone CH_3COCH_2I	183.97		58.4 ¹¹	2.17 ¹⁸	
393	$C_3H_5IO_2$	1-Iodopropionic acid CH_3CHICO_2H	199.97	45.5	105 ^{9,1}		
394	$C_3H_5IO_2$	2-Iodopropionic acid $ICH_2CH_2CO_2H$	199.97	82			
395	C_3H_5N	Propionitrile C_2H_5CN	55.047	-91.9	97.1	0.783	22
396	C_3H_5N	Ethyl isocyanide C_2H_5NC	55.047	< -66	79	0.742 ^{21,1}	19
397	C_3H_5NO	Ethyl isocyanate C_2H_5CNO	71.047		60	0.898	
398	C_3H_5NO	Acrylamide $CH_2=CHCONH_2$	71.047	85			
399	C_3H_5NO	2-Hydroxypropionitrile $HOCH_2CH_2CN$	71.047		221	1.059	
400	C_3H_5NO	Lactonitrile $CH_3CH(OH)CN$	71.047	-40.0	184 s. d.	0.992	944
401	$C_3H_5NO_2$	Isomitosuccinate $CH_3COCH(OH)CN$	87.407	69			
402	$C_3H_5NO_2$	Allyl nitrite C_3H_5ONO	87.047		44	0.955 ⁹	
403	C_3H_5NS	Ethyl thiocyanate C_2H_5CNS	87.112	-85.5	144.4	0.996	494
404	C_3H_5NS	Ethyl isothiocyanate C_2H_5CSN	87.112	-5.9	132	0.995	651
405	$C_3H_5NS_2$	μ -Mercaptothiazoline	119.177		217		
406	$C_3H_5N_3O_6$	Glycerol trinitrate	179.06		154	1.291 ^{10,1}	
407	$C_3H_5N_3O_6$	Glycerol trimnitrate	227.06	2.9	160 ¹⁸	1.601 ¹⁸	
				13.2	exp. 260		
408	C_3H_6	Cyclopropane	42.046	-126.6	-34.4	0.720 ^{7,9}	
409	C_3H_6	Propylene $CH_3CH=CH_2$	42.046	-185.2	-47.0	0.609 ⁴⁷	
410	C_3H_6AsN	Cacodyl cyanide $(CH_3)_2AsCN$	131.014		138		
411	$C_3H_6Br_2$	1, 1-Dibromopropane $CH_3CH_2CHBr_2$	201.88		130		
412	$C_3H_6Br_2$	1, 2-Dibromopropane $CH_3CHBrCH_2Br$	201.88	-55.5	140	1.933	664
413	$C_3H_6Br_2$	1, 3-Dibromopropane	201.88	-34.4	167.0	1.979	671
414	$C_3H_6Br_2$	2, 2-Dibromopropane $CH_3CBr_2CH_3$	201.88		114.5	1.783	
415	$C_3H_6Br_2O$	1, 1'-Dibromoisopropyl alcohol	217.88		219	2.11 ¹⁸	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
416	C ₃ H ₇ BrO	2, 3-Dibromopropyl alcohol	217.88		219	2.108°	
417	C ₃ H ₇ Cl ₂	1, 1-Dichloropropene CH ₂ CH ₂ CHCl ₂	112.062		87	1.143 ¹⁴	
418	C ₃ H ₇ Cl ₂	1, 2-Dichloropropene CH ₃ CHClCH ₂ Cl	112.062		96.8	1.166 ¹⁴	
419	C ₃ H ₇ Cl ₂	1, 3-Dichloropropene ClCH ₂ CHClCH ₂ Cl	112.062		125	1.201 ¹⁴	177
420	C ₃ H ₇ Cl ₂	2, 2-Dichloropropene CH ₃ CCl ₂ CH ₂	112.062		69.7	1.093	
421	C ₃ H ₇ Cl ₂ O	1, 1-Dichloroisopropyl alcohol	128.06		147.8	1.333	532
422	C ₃ H ₇ Cl ₂ O	1, 1'-Dichloroisopropyl alcohol	128.06		174	1.367	
423	C ₃ H ₇ Cl ₂ O	2, 3-Dichloropropyl alcohol	128.06		183	1.355	
424	C ₃ H ₇ Cl ₂ O ₂	Dichloromethylal H ₂ C(OCH ₂ Cl) ₂	144.06		166	1.352 ¹¹	
425	C ₃ H ₇ Cl ₂ N ₃	cis-Chloralimide.....	103.19	155			
426	C ₃ H ₇ INO	Iodonacetoxime ICH ₂ C(=NOH)CH ₃	198.99	61.5			
427	C ₃ H ₇ I ₂	1, 2-Diiodopropene CH ₃ CHICH ₂ I	295.91		d.	2.490	797
428	C ₃ H ₇ I ₂	1, 3-Diiodopropene ICH ₂ CH ₂ CH ₂ I	295.91	-13.0	224	2.576 ¹⁴	
429	C ₃ H ₇ I ₂	2, 2-Diiodopropene (CH ₃) ₂ CI ₂	295.91		118 d	2.446°	
431	C ₃ H ₇ N ₂	Pyrazoline.....	70.062		144		
432	C ₃ H ₇ N ₂ O	Ethyleneurea —CH ₂ NHCONHCH ₂	86.062	131			
433	C ₃ H ₇ N ₂ O	Ethylideneurea CH ₃ CH ₂ NCONH ₂	86.062	154	100 d		
434	C ₃ H ₇ N ₂ OS	Acetylthiourea CH ₃ CONHCSNH ₂	118.13	165			
435	C ₃ H ₇ N ₂ O ₂	Acetylurea NH(COCH ₃) ₂	102.062	217			
436	C ₃ H ₇ N ₂ O ₂	Malonamide H ₂ C(CONH ₂) ₂	102.062	170			
437	C ₃ H ₇ N ₂ O ₂	Methylglyoxime	102.06	153			
438	C ₃ H ₇ N ₂ O ₂	Hydantoic acid...	118.062	171			
439	C ₃ H ₇ N ₂ O ₂	Propylnitrolic acid	118.06	60			
440	C ₃ H ₇ N ₂ O ₂	Methyl allophanate	118.06	208			
441	C ₃ H ₇ N ₂ O ₂	Propylpseudonitrole	118.06	76			
442	C ₃ H ₇ N ₂ O ₂	Nitrourethane C ₃ H ₇ CO ₂ NHNO ₂	134.06	64			
443	C ₃ H ₇ N ₂ O ₂	Glycerol-1, 3-dinitrate	182.06	<-30	148 ¹⁴	1.47 ¹⁴	1166
444	C ₃ H ₇ N ₂ O ₂	Ammonium fulminate	146.078	d.			1311
445	C ₃ H ₇ N ₃	Melamine (CNNH ₂) ₃	126.094	<250		1.573 ¹⁰⁰	204
446	C ₃ H ₇ N ₃	Allyl alcohol CH ₂ :CHCH ₂ OH	58.046	-129	97.0	0.855	20
447	C ₃ H ₇ O	Propionaldehyde C ₃ H ₇ CHO	58.046	-81	48.8	0.807	14
448	C ₃ H ₇ O	Acetone CH ₃ COCH ₃	58.046	-94.3	56.1	0.7915	315
449	C ₃ H ₇ O ₂	Acetyl carbinol CH ₃ COCH ₂ OH	74.046	-17	146	1.082 ²³ ₁₀	63
450	C ₃ H ₇ O ₂	Propionic acid C ₃ H ₇ CO ₂ H	74.046	-22	141.1	0.992	15
451	C ₃ H ₇ O ₂	Ethyl formate HCO ₂ C ₂ H ₅	74.046	-80.5	54.3	0.906	18
452	C ₃ H ₇ O ₂	Methyl acetate CH ₃ CO ₂ CH ₃	74.046	-98.1	57.1	0.933	
453	C ₃ H ₇ O ₂	Glycide C ₂ H ₄ OCH ₂ OH	74.046		162 d.	1.165	
454	C ₃ H ₇ O ₂	Glyceric aldehyde HOCH ₂ CH(OH)CHO	90.046	138			
455	C ₃ H ₇ O ₂	Dihydroxyacetone HOCH ₂ COCH ₂ OH	90.046	75			
456	C ₃ H ₇ O ₂	d(l)-Lactic acid CH ₃ CH(OH)CO ₂ H	90.046	27	122 ¹⁴	1.249 ¹⁴	381
457	C ₃ H ₇ O ₂	dl-Lactic acid CH ₃ CH(OH)CO ₂ H	90.046	18	80.7	1.069 ²²	
458	C ₃ H ₇ O ₂	Dimethyl carbonate (CH ₃ O) ₂ CO	90.046	0.5			
459	C ₃ H ₇ O ₂	Ethyl acid carbonate C ₂ H ₅ HCO ₂	90.046	-57	151.2	1.108 ¹⁶	
460	C ₃ H ₇ O ₂	Methyl glycolate HOCH ₂ CO ₂ CH ₃	90.046	64	8.46		
461	C ₃ H ₇ O ₂	α-Trihydroxymethylene	74.111		90		
462	C ₃ H ₇ As	Allyl mercaptan CH ₂ :CHCH ₂ SH	166.01	128			
463	C ₃ H ₇ AsO ₃	Allylarsonic acid...	122.97	-110.0	70.9	1.353	346
464	C ₃ H ₇ Br	n-Propyl bromide CH ₃ CH ₂ CH ₂ Br	122.97	-89.0	59.6	1.310	289
465	C ₃ H ₇ Br	Isopropyl bromide (CH ₃) ₂ CHBr	138.97		148		
466	C ₃ H ₇ BrO	Bromoisopropyl alcohol	138.97		112 ¹⁴	1.537	71
467	C ₃ H ₇ BrO	3-Bromopropyl alcohol	138.97	-122.8	46.6	0.890	
468	C ₃ H ₇ Cl	n-Propyl chloride CH ₃ CH ₂ CH ₂ Cl	78.512	-117.0	36.5	0.860	371
469	C ₃ H ₇ Cl	Isopropyl chloride (CH ₃) ₂ CHCl	78.512		126	1.115 ²⁰	354
470	C ₃ H ₇ ClO	Chloroisopropyl alcohol	94.512		134	1.103	
471	C ₃ H ₇ ClO	2-Chloropropyl alcohol	94.512		124.5 ¹⁴	1.321	
472	C ₃ H ₇ ClO ₂	2-Chloro-1, 3-dihydroxypropane	110.512		213 d.	1.322	
473	C ₃ H ₇ ClO ₂	3-Chloro-1, 2-dihydroxypropane	110.512		2		621
474	C ₃ H ₇ F	n-Propyl fluoride CH ₃ CH ₂ CH ₂ F	62.054	-101.4	102.4	1.747	597
475	C ₃ H ₇ I	n-Propyl iodide CH ₃ CH ₂ CH ₂ I	169.99	-90.8	89.5	1.703	
476	C ₃ H ₇ I	Isopropyl iodide (CH ₃) ₂ CHI	169.99		105 ⁶⁰		
477	C ₃ H ₇ IO	Iodoisopropyl alcohol	185.99		225.4	2.349 ¹³	237
478	C ₃ H ₇ IO	3-Iodopropyl alcohol...	185.99		53.2	0.761	
479	C ₃ H ₇ N	Allylamine CH ₂ :CHCH ₂ NH ₂	57.062				

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
480	C ₃ H ₇ NO	Aminoacetone CH ₃ COCH ₂ NH ₂	73.062		189 d.		
481	C ₃ H ₇ NO	Acetoxime CH ₃ CH=NOH	73.062	61	136.3	0.97 ₂₀ ²⁰	1162
482	C ₃ H ₇ NO	Propionamide C ₂ H ₅ CONH ₂	73.062	79	213	1.042	1153
483	C ₃ H ₇ NOS	Thiourethane C ₂ H ₅ COSNH ₂	105.13	108			
484	C ₃ H ₇ NO ₂	<i>d</i> -Alanine CH ₃ CH(NH ₂)CO ₂ H	89.062				1225
485	C ₃ H ₇ NO ₂	<i>dl</i> -Alanine	89.062	295	s. >200		
486	C ₃ H ₇ NO ₂	Sarcosine CH ₃ NHCH ₂ CO ₂ H	89.062	210 d.			
487	C ₃ H ₇ NO ₂	1-Nitropropane C ₂ H ₅ CH ₂ NO ₂	89.062		131.5	1.011 ₁₆ ¹⁶	136
488	C ₃ H ₇ NO ₂	2-Nitropropane CH ₃ CH(NO ₂)CH ₃	89.062		120	1.024 ⁰	
489	C ₃ H ₇ NO ₂	Propyl nitrate C ₃ H ₇ ONO	89.062		57	0.935	16
490	C ₃ H ₇ NO ₂	Isopropyl nitrate (CH ₃) ₂ CHONO	89.062		45	0.844 ₂₆ ²⁶	
491	C ₃ H ₇ NO ₂	Lactamide CH ₃ CH(OH)CONH ₂	89.062	74		1.138 ₁₀ ¹⁰	
492	C ₃ H ₇ NO ₂	Urethane C ₂ H ₅ OC(=O)NH ₂	89.062	48	180	1.11 ₁₀ ¹⁰	
493	C ₃ H ₇ NO ₂	<i>dl</i> -Serine HOCH ₂ CH(NH ₂)CO ₂ H	105.062	246 d.			1249
493 1	C ₃ H ₇ NO ₂	<i>d</i> -Serine HOCH ₂ CH(NH ₂)CO ₂ H	105.062	228 d.			
494	C ₃ H ₇ NO ₂	Iso-serine H ₂ NCH ₂ CH(OH)CO ₂ H	105.062	242 d.			
495	C ₃ H ₇ NO ₂	Propyl nitrate C ₃ H ₇ ONO	105.062		100.5	1.053 ₂₆ ²⁶	105
496	C ₃ H ₇ NO ₂	Isopropyl nitrate (CH ₃) ₂ CHONO	105.062		102	1.036	
497	C ₃ H ₇ NO ₂	Glycerol-1-nitrate	137.06	58	160	1.40	
498	C ₃ H ₇ NO ₂	Glycerol-2-nitrate	137.06	54	160	1.40	
499	C ₃ H ₇ N ₂ O	Acetaldehyde semicarbazone	101.08	162			
500	C ₃ H ₈	Propane CH ₃ CH ₂ CH ₃	44.062	-189.9	-44.5	0.585 ₄₄ ⁴⁴	
501	C ₃ H ₈ ClNO ₂ S	Cysteine hydrochloride	157.59	175			
502	C ₃ H ₈ N ₂ O	1, 2-Dimethylurea CO(NHCH ₃) ₂	88.078	102.5	270	1.142	
503	C ₃ H ₈ N ₂ O	1, 1-Dimethylurea (CH ₃) ₂ NCONH ₂	88.078	182		1.255	
504	C ₃ H ₈ N ₂ O	Ethylurea C ₂ H ₅ NHCONH ₂	88.078	92		1.213 ₁₈ ¹⁸	
505	C ₃ H ₈ O	<i>n</i> -Propyl alcohol C ₂ H ₅ CH ₂ OH	60.062	-127	97.8	0.804	59
506	C ₃ H ₈ O	Isopropyl alcohol (CH ₃) ₂ CHOH	60.062	-85.8	82.3	0.786	37
508	C ₃ H ₈ O	Methyl ethyl ether CH ₃ OC ₂ H ₅	60.062		7.9	0.697	
509	C ₃ H ₈ OS ₂	1, 2-Dithioglycerol	124.192	130 d.		1.342 ₁₁ ¹¹	
510	C ₃ H ₈ O ₂	1, 2-Propyleneglycol	76.062		189	1.038 ₂₄ ²⁴	
511	C ₃ H ₈ O ₂	Trimethyleneglycol HO(CH ₂) ₃ OH	76.062		214 d.	1.053	
512	C ₃ H ₈ O ₂	Glycol methyl ether HOCH ₂ CH ₂ OCH ₃	76.062		124.6	0.969 ₁₈ ¹⁸	
513	C ₃ H ₈ O ₂	Methylal HCH(OCH ₃) ₂	76.062	-104.8	44	0.862	8
514	C ₃ H ₈ O ₂ S	1-Thioglycerol HOCH ₂ (CH ₂ OH)CH ₂ SH	108.127		d.	1.295 ₁₄ ¹⁴	
515	C ₃ H ₈ O ₂	Glycerol HOCH ₂ (CH ₂ OH) ₂	92.062	17.9	290	1.260	512
516	C ₃ H ₈ S ₂	Trithioglycerol HSCH ₂ (CH ₂ SH) ₂	110.257	d.		1.391 ₁₁ ¹¹	
517	C ₃ H ₈ S	Methyl ethyl sulfide CH ₃ SC ₂ H ₅	76.127	-104.8	66	0.837	
518	C ₃ H ₈ S	<i>n</i> -Propyl mercaptan C ₂ H ₅ SH	76.127	-111.5	68		
519	C ₃ H ₈ S	Isopropyl mercaptan (CH ₃) ₂ CHSH	76.127		60		
520	C ₃ H ₈ As	Trimethylarsine (CH ₃) ₃ As	120.029		52.8	1.124 ₂₂ ²²	
521	C ₃ H ₈ AsO ₃	Propylarsine acid C ₂ H ₅ AsO ₃ H	168.03	126			
522	C ₃ H ₈ Bi	Trimethyl bismuthine (CH ₃) ₃ Bi	254.07		110	2.300 ₁₈ ¹⁸	
523	C ₃ H ₈ ClN ₂ O	Lactamide hydrochloride	124.54	171			
524	C ₃ H ₇ N	<i>n</i> -Propylamine C ₂ H ₅ NH ₂	59.077	-83.0	48.7	0.719	72
525	C ₃ H ₇ N	Isopropylamine (CH ₃) ₂ CHNH ₂	59.077	-101.2	34	0.694	875
526	C ₃ H ₇ N	Trimethylamine (CH ₃) ₃ N	59.077	-124.0	3.5	0.662 ₃ ³	
527	C ₃ H ₇ N ₂ O ₄	Guanidine acetate	119.09	230			
528	C ₃ H ₇ O ₄ P	Trimethyl phosphate (CH ₃) ₃ PO ₄	140.09		193	1.220 ₁₈ ¹⁸	
529	C ₃ H ₇ P	Propylphosphine C ₂ H ₅ PH ₂	76.093		53.5		
530	C ₃ H ₇ P	Trimethylphosphine (CH ₃) ₃ P	76.093		42	>1	
531	C ₃ H ₇ Sb	Trimethylstibine (CH ₃) ₃ Sb	166.84		80.6	1.523 ₁₈ ¹⁸	
532	C ₃ H ₁₀ CN	Trimethylamine hydrochloride	95.543	275 d.			
533	C ₃ H ₁₀ N ₂	<i>dl</i> -Propylenediamine CH ₃ (CH ₂ NH ₂) ₂	74.093		119	0.878	
534	C ₃ H ₁₀ N ₂	Trimethylenediamine H ₂ N(CH ₂) ₃ NH ₂	74.093		135.5		
535	C ₃ H ₁₁ N ₂ O ₄	Guanidine carbonate	180.11	197		1.251 ⁴	1169
537	C ₄ Br ₄ S	Thiophene tetrabromide	399.73	112			
538	C ₄ Cl ₄ O	Perchloroether (C ₂ Cl ₅) ₂ O	418.58	69		1.900 ₁₄ ¹⁴	
539	C ₄ F ₄ O ₃	Trifluoroacetic anhydride (F ₃ CCO) ₂ O	210.00	-65	40.5		
540	C ₄ I ₄	Diiododiacetylene IC ₂ CCl	301.86	101			
541	C ₄ HBr ₄ N	Tetrabromopyrrole	382.68	250			
542	C ₄ HI ₄ N	Tetraiodopyrrole	570.74	150 d.			
543	C ₄ HN ₄	Cyanoform CH(CN) ₃	91.032	93.5			

C-TABLE: C₂H₂ TO C₆H₆

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
544	C ₂ H ₂ ClN ₂ O ₂	5, 5-Dichlorobarbituric acid	196.95	211 d.			
545	C ₂ H ₂ Cl ₂ O ₂	Fumaryl chloride ClOCC=CHCOCl	152.93		160	1.410	938
546	C ₂ H ₂ I ₂ S	Thiophene diiodide	335.94	40			
547	C ₂ H ₂ N ₂ O ₄	Alloxan OC(NHCO) ₂ CO	142.03	256 d.			
548	C ₂ H ₂ O ₄	Maleic anhydride (CHCO) ₂ O	98.015	57	202	0.934	
549	C ₂ H ₂ O ₄	Acetylenedicarboxylic acid	114.02	179			
550	C ₂ H ₂ BrO ₄	Bromofumaric acid	194.94	186			
551	C ₂ H ₂ BrO ₄	Bromomaleic acid HO ₂ CCBrCHCO ₂ H	194.94	141			
552	C ₂ H ₂ ClN ₂ O ₂	5-Chlorobarbituric acid	162.50	295 s. d.			
553	C ₂ H ₂ NO ₂ S	2-Nitrothiophene	129.096	46.5	225		
554	C ₂ H ₂ N ₂ O ₄	Violic acid	157.05	224 d.			
555	C ₂ H ₂ AsCl ₃	bis-2-Chlorovinyl chloroarsine	243.36		230	1.702	
556	C ₂ H ₂ BrNS	2-Bromoallyl isothiocyanate	178.02		200		
557	C ₂ H ₂ Br ₂ O ₄	1, 2-Dibromosuccinic acid	275.86	255			
558	C ₂ H ₂ Cl ₂ O ₂	Succinyl chloride (CH ₂ COCl) ₂	154.95	17	192	1.395	872
559	C ₂ H ₂ Cl ₂ O ₂	Chloroacetic anhydride (ClCH ₂ CO) ₂ O	170.95	46	163 ¹⁴		
560	C ₂ H ₂ N ₂	Succinyl nitrile (CH ₂ CN) ₂	80.047	54.5	267	0.985 ¹⁴	1097
561	C ₂ H ₂ N ₂	Pyridazine (1, 2-Diazine)	80.047	-8	208	1.107	1015
562	C ₂ H ₂ N ₂	Pyrimidine (1, 3-Diazine)	80.047	22	124		
563	C ₂ H ₂ N ₂	Pyrazine (1, 4-Diazine)	80.047	53	118	1.031 ¹⁴	1091
564	C ₂ H ₂ N ₂ O ₂	Uracil —NHCONHCH=CHCO	112.05	338			
565	C ₂ H ₂ N ₂ O ₃	Barbituric acid OC(NHCO) ₂ CH ₂	128.047	245	200 d.		
567	C ₂ H ₂ N ₄	Hydrocyanic acid (tetramer)	108.063	179 d.			
568	C ₂ H ₂ O	Tetrolie aldehyde CH ₂ C=CHO	68.031	-26	107	0.927 ¹⁷	913
569	C ₂ H ₂ O	Furfural (Furan)	68.031		31	0.937	260
570	C ₂ H ₂ O ₂	Tetrolie acid CH ₂ C=CCO ₂ H	84.031	76.5	203		
571	C ₂ H ₂ O ₂	Succinic anhydride	100.031	119.0	261	1.104	
572	C ₂ H ₂ O ₂	Tetronic acid —OC(H ₂ C(OH))CHCO	100.03	141			
573	C ₂ H ₂ O ₄	Fumaric acid (CHCO ₂ H) ₂	116.031	287	200	1.635	
574	C ₂ H ₂ O ₄	Maleic acid (CHCO ₂ H) ₂	116.031	130.5	135 d.	1.590	
575	C ₂ H ₂ O ₄	Hydroxymaleic acid	132.03	152			
576	C ₂ H ₂ S	Thiophene	81.090	-40.0	85	1.065	693
577	C ₂ H ₂ BrO ₄	Bromosuccinic acid	196.95	159			
578	C ₂ H ₂ ClO	Crotonyl chloride CH ₃ CH=CHCOCl	101.497		125	1.091	
579	C ₂ H ₂ ClO ₂	1-Chloro-α-crotonic acid	120.50	99			
580	C ₂ H ₂ ClO ₂	1-Chloro-β-crotonic acid	120.50	66			
581	C ₂ H ₂ ClO ₂	2-Chloro-β-crotonic acid	120.50	61			
582	C ₂ H ₂ Cl ₂ O	1, 1, 2-Trichlorobutyraldehyde	175.41		165.4	1.396	523
583	C ₂ H ₂ Cl ₂ O ₂	1, 1, 2-Trichlorobutyric acid	191.41	60	238		
584	C ₂ H ₂ Cl ₂ O ₂	1, 1, 3-Trichlorobutyric acid	191.41	75			
585	C ₂ H ₂ Cl ₃ O ₂	Ethyl trichloroacetate Cl ₃ CCO ₂ C ₂ H ₅	191.41		168	1.383	437
586	C ₂ H ₂ F ₃ O ₂	Ethyl trifluoroacetate F ₃ CCO ₂ C ₂ H ₅	142.039		61.7	1.195 ¹⁸	1
587	C ₂ H ₂ N	Allyl cyanide CH ₂ CHCH ₂ CN	67.047		116.1	0.832	212
588	C ₂ H ₂ N	Allyl isocyanide CH ₂ CHCH ₂ NC	67.047		106	0.794 ¹⁷	
589	C ₂ H ₂ N	Pyrrrole	67.047		131	0.948	612
590	C ₂ H ₂ NO ₂	Ethyl cyanoformate NCCO ₂ C ₂ H ₅	99.047		116	1.013	
591	C ₂ H ₂ NO ₂	Methyl cyanoacetate NCCH ₂ CO ₂ CH ₃	99.047		200	1.123 ¹⁸	
592	C ₂ H ₂ NO ₂	Succinimide	99.047	124	288	1.412 ¹⁸	1333
593	C ₂ H ₂ NS	Allyl thiocyanate CH ₂ CHCH ₂ CNS	99.112		161	1.050	
594	C ₂ H ₂ NS	Allyl isothiocyanate CH ₂ CHCH ₂ CNS	99.112	-100.0	150.7	1.010 ²⁰	687
595	C ₂ H ₄	1, 2-Butadiene CH ₂ =C=CHCH ₃	54.046		19		
596	C ₂ H ₄	1, 3-Butadiene CH ₂ =CHCH=CH ₂	54.046		-2.6		
597	C ₂ H ₄	Dimethylacetylene (CH ₃ C) ₂	54.046		28.9		
598	C ₂ H ₄	Ethylacetylene C ₂ H ₅ C≡CH	54.046	-130	18.5	0.668 ⁹	101
599	C ₂ H ₄ As ₂ O ₄	Diarsenodiacetic acid	267.97	205 d.			
600	C ₂ H ₄ Br ₂ O ₂	Ethyl dibromoacetate Br ₂ CHCO ₂ C ₂ H ₅	245.88		194	1.903	588
601	C ₂ H ₄ Br ₄	1, 1, 4, 4-Tetrabromobutane	373.71		145 ¹⁰	2.529	782
602	C ₂ H ₄ Br ₄	1, 2, 3, 4-Tetrabromobutane	373.71	19; 39	181 ¹⁰		
603	C ₂ H ₄ Br ₄	2, 2, 3, 3-Tetrabromobutane	373.71	39	230		
604	C ₂ H ₄ Cl ₂ O ₂	Ethyl dichloroacetate	156.96		158.2	1.282	367
604.1	C ₂ H ₄ Cl ₂ O ₂	Methyl 1, 2-dichloropropionate	156.96		92 ¹⁰	1.328	
605	C ₂ H ₄ Cl ₄ O	1, 2, 2, 2-Tetrachloroethyl ether	211.88		189.7	1.422	
606	C ₂ H ₄ N ₄	1-Methylimidazole	82.062	-6	199	1.036 ¹⁰	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
607	C ₄ H ₅ N ₃	4-Methylimidazole	82.062	56	262.9	1.008	
608	C ₄ H ₅ N ₃	1-Methylpyrazole	82.062		127	0.993 ¹⁴	828
608 1	C ₄ H ₅ N ₃	3-Methylpyrazole	82.062			1.020	898
608 2	C ₄ H ₅ N ₃	5-Methylpyrazole	82.062		204	1.022	
609	C ₄ H ₅ N ₃ O ₂	Ethyl diazoacetate	114.062	-22	59 ¹²	1.085 ^{17, 6}	927
609 1	C ₄ H ₅ N ₃ O ₂ S	3-Methylpyrazole-4-sulfonic acid	162.22	258			1267
610	C ₄ H ₅ N ₃ O ₄	Allantoin	158.08	235			1328
611	C ₄ H ₅ N ₃ O ₁₂	Erythritol tetramtrate	302.08	61			
612	C ₄ H ₈ O	Methyl propargyl ether	70.046		62	0.83 ^{12, 5}	
613	C ₄ H ₈ O	Vinyl ether (CH ₂ :CH) ₂ O	70.046		39		
614	C ₄ H ₆ O	Crotonaldehyde (CH ₃ :CH:CHCHO)	70.046	-75	104	0.859 ¹⁴	361
615	C ₄ H ₈ O	Dimethylketene (CH ₃) ₂ C=CO	70.046	-97.5	34.3		
616	C ₄ H ₆ O ₂	Succinic dialdehyde (CH ₂ CHO) ₂	86.046		57 ¹⁰	1.064	290
617	C ₄ H ₆ O ₂	α -Crotonic acid CH ₃ :CH:CHCO ₂ H	86.046	72	185	0.964 ^{19, 7}	1112
619	C ₄ H ₆ O ₂	β -Crotonic acid CH ₃ :C(CH ₃)CO ₂ H	86.046	14.6	171.9 d.	1.027	411
620	C ₄ H ₆ O ₂	1-Methylacrylic acid	86.046	16	163	1.015	333
621	C ₄ H ₆ O ₂	Trimethylenecarboxylic acid	86.046	17	182.5	1.088	
622	C ₄ H ₆ O ₂	Vinylacetic acid CH ₂ :CHCH ₂ CO ₂ H	86.046	-39	163	1.013 ^{12, 6}	849
623	C ₄ H ₆ O ₂	Allyl formate HCO ₂ C ₃ H ₅	86.046		83	0.948 ¹⁸	
624	C ₄ H ₆ O ₂	Methyl acrylate CH ₂ :CHCO ₂ CH ₃	86.046		80.5	0.956 ¹⁸	113
625	C ₄ H ₆ O ₂	Diacetyl CH ₃ COCOCH ₃	86.046		88	0.975	85
626	C ₄ H ₆ O ₃	Acetic anhydride (CH ₃ CO) ₂ O	102.046	-73.0	139.6	1.082	81
627	C ₄ H ₆ O ₃	1-Ketobutyric acid C ₃ H ₅ COCO ₂ H	102.046	32	85 ²¹		
628	C ₄ H ₆ O ₃	Methyl pyruvate CH ₃ COCO ₂ CH ₃	102.046		137	1.154 ⁹	
629	C ₄ H ₆ O ₄	Succinic acid (CH ₂ CO ₂ H) ₂	118.046	185	235	1.562	1220
630	C ₄ H ₆ O ₄	Isosuccinic acid CH ₃ CH(CO ₂ H) ₂	118.046	135		1.455	
631	C ₄ H ₆ O ₄	Dimethyl oxalate (CO ₂ CH ₃) ₂	118.046	54.0	163.3	1.120 ¹²	1122
632	C ₄ H ₆ O ₄	Ethyl hydrogen oxalate HO ₂ CCO ₂ C ₂ H ₅	118.046		117 ¹⁵	1.218	
633	C ₄ H ₆ O ₄	Diglycollic acid O(CH ₂ CO ₂ H) ₂	134.05	148			
634	C ₄ H ₆ O ₅	Glycollic anhydride (CH ₂ OHCO) ₂ O	134.05	130			
635	C ₄ H ₆ O ₅	<i>l</i> -Malic acid HO ₂ CCH ₂ CH(OH)CO ₂ H	134.05	100	140 d.	1.595	
636	C ₄ H ₆ O ₅	<i>dl</i> -Malic acid	134.05	129	150 d.	1.601	
637	C ₄ H ₆ O ₅	Isomalic acid CH ₃ C(OH)(CO ₂ H) ₂	134.05	160 d.			
638	C ₄ H ₆ O ₆	Mesotartaric acid	150.05	110		1.666	1224
639	C ₄ H ₆ O ₆	<i>d</i> -Tartaric acid	150.05	170		1.760	1222
640	C ₄ H ₆ O ₆	<i>dl</i> -Tartaric acid	150.05	206		1.687	
641	C ₄ H ₆ O ₆	Dihydroxytartaric acid	182.05	114			
642	C ₄ H ₆ S	Divinyl sulfide (CH ₂ :CH) ₂ S	86.111		101	0.912	
643	C ₄ H ₇ Br	Vinylethyl bromide CH ₂ :CHCH ₂ CH ₂ Br	134.97		99.0		
644	C ₄ H ₇ BrO	Bromomethyl ethyl ketone	150.97		146		
645	C ₄ H ₇ BrO ₂	1-Bromobutyric acid C ₃ H ₇ CHBrCO ₂ H	166.97	-4	115 ²⁰	1.574 ¹⁵	
646	C ₄ H ₇ BrO ₂	2-Bromobutyric acid	166.97	18	122 ¹⁶		
647	C ₄ H ₇ BrO ₂	3-Bromobutyric acid	166.97	32			
648	C ₄ H ₇ BrO ₂	1-Bromoethyl acetate	166.97		63 ²⁹	1.4620	395
648 1	C ₄ H ₇ BrO ₂	2-Bromoethyl acetate	166.97		70 ²⁷	1.5140	450
648 2	C ₄ H ₇ BrO ₂	Ethyl bromoacetate BrCH ₂ CO ₂ C ₂ H ₅	166.97		159	1.514 ¹⁸	438
648 3	C ₄ H ₇ BrO ₂	Methyl 1-bromopropionate	166.97		68.5 ⁴⁸	1.4917	436
648 4	C ₄ H ₇ BrO ₂	Methyl 2-bromopropionate	166.97		79 ⁴⁶	1.5192	460
649	C ₄ H ₇ Br ₃	1, 2, 3-Tribromobutane	294.80		113 ¹⁹	2.190	752
650	C ₄ H ₇ BrO	1, 1, 1-Tribromo- <i>tert</i> -butyl alcohol	310.80	176			
651	C ₄ H ₇ ClO	Butyryl chloride C ₃ H ₇ COCl	106.51	-89.0	102	1.028	194
652	C ₄ H ₇ ClO	Isobutyryl chloride (CH ₃) ₂ CHCOCl	106.51	-90.0	92	1.017	168
653	C ₄ H ₇ ClO ₂	1-Chlorobutyric acid C ₃ H ₇ CHClCO ₂ H	122.51		101.3 ¹⁰		
654	C ₄ H ₇ ClO ₂	<i>d</i> -2-Chlorobutyric acid	122.51	44	100 ¹³		
655	C ₄ H ₇ ClO ₂	<i>dl</i> -2-Chlorobutyric acid	122.51	16.5	116 ²²	1.186	386
656	C ₄ H ₇ ClO ₂	3-Chlorobutyric acid	122.51	16	196 ²²	1.250 ¹⁰	
657	C ₄ H ₇ ClO ₂	1-Chloroethyl acetate	122.51		46 ⁴⁵	1.1124	190
657 1	C ₄ H ₇ ClO ₂	2-Chloroethyl acetate	122.51		145	1.178 ⁹	285
658	C ₄ H ₇ ClO ₂	Ethyl chloroacetate ClCH ₂ CO ₂ C ₂ H ₅	122.51		144.2	1.159	267
659	C ₄ H ₇ ClO ₂	Methyl 2-chloropropionate	122.51		148	1.187	
660	C ₄ H ₇ ClO ₂	<i>n</i> -Propyl chloroformate ClCO ₂ C ₃ H ₇	122.51		116	1.083 ²⁵	
661	C ₄ H ₇ Cl ₃ O	1, 2, 2-Trichloroethyl ethyl ether	177.43		170	1.330 ¹⁴	
662	C ₄ H ₇ Cl ₃ O	1, 1, 1-Trichloro- <i>tert</i> -butyl alcohol	177.43	97	166.4		

C-TABLE: C₂H₄ TO C₂H₈

No	Formula	Name	Mol. wt	M. P.	B. P.	d	R. I. No.
663	C ₂ H ₃ Cl ₃ O ₂	Chloral alcoholate Cl ₂ CCHO.C ₂ H ₅ OH	193.43	55	115	1.143 ¹⁰	
664	C ₂ H ₃ Cl ₃ O ₂	1, 1, 2-Trichlorobutyraldehyde hydrate	193.43	78		1.694 ⁴	
665	C ₂ H ₅ FO ₂	Ethyl fluoroacetate FCH ₂ CO ₂ C ₂ H ₅	106.054			1.093	33
666	C ₂ H ₅ IO ₂	Ethyl iodoacetate ICH ₂ CO ₂ C ₂ H ₅	213.99		180	1.817 ^{12, 1}	618
667	C ₂ H ₅ N	n-Butyronitrile C ₂ H ₅ CN	69.062	-112.0	118	0.794	47
668	C ₂ H ₅ N	Isobutyronitrile (CH ₃) ₂ CHCN	69.062		108		
669	C ₂ H ₅ N	Isopropylisocyanide (CH ₃) ₂ CHNC	69.062		87	0.700	
670	C ₂ H ₅ N	Pyrroline	69.062		91	0.910	
671	C ₂ H ₅ NO	Acetonecyanhydrin (CH ₃) ₂ C(OH)CN	85.062	-19	82 ²¹	0.932 ¹⁹	117
672	C ₂ H ₅ NO	α-Pyrrolidone	85.062	25	250.8	1.116	
673	C ₂ H ₅ NO ₂	Diacetamide NH(COCH ₃) ₂	101.062	78	223.5		
674	C ₂ H ₅ NO ₂	Diacetylmonoxime CH ₃ COC(=NOH)CH ₃	101.062	74	186		
675	C ₂ H ₅ NO ₂ S	Ethyl thiooxamate H ₂ NCSCOC ₂ H ₅	133.13	63			
676	C ₂ H ₅ NO ₂	Acetylaminooacetic acid	117.062	206			
677	C ₂ H ₅ NO ₂	Diacetohydroxamic acid	117.06	89			
678	C ₂ H ₅ NO ₂	Ethyl oxamate H ₂ NCO.CO ₂ C ₂ H ₅	117.06	115			
679	C ₂ H ₅ NO ₂	L-Aspartic acid	133.06	270		1.061 ^{12, 2}	
679.1	C ₂ H ₅ NO ₂	Nitrotetronic acid dihydrate	181.06	d. 184		1.084	1190
680	C ₂ H ₅ NO ₂	Ammonium tetraoxalate	197.06	130.5		1.007	
681	C ₂ H ₅ NS	Propyl isothiocyanate	101.127		153	0.991	
682	C ₂ H ₅ N ₂ O	Creatinine	113.078	260 d.			
683	C ₂ H ₆	Cyclobutane (CH ₂) ₄	56.062	-50	13	0.703 ⁶	801
684	C ₂ H ₆	1, 1-Dimethylethylene CH ₂ C(CH ₃) ₂	56.062		-6		
685	C ₂ H ₆	1, 2-Dimethylethylene CH ₃ CH:CHCH ₃	56.062		1.4		
686	C ₂ H ₆	Ethylethylene C ₂ H ₅ CH:CH ₂	56.062	-130	-18	0.608 ⁹	102
687	C ₂ H ₆	Methylcyclopropane (CH ₂) ₃ CHCH ₃	56.062		5	0.691 ⁻²⁰	
688	C ₂ H ₄ Br ₂	1, 2-Dibromobutane C ₂ H ₅ CHBrCH ₂ Br	215.89		166	1.820	
689	C ₂ H ₄ Br ₂	1, 3-Dibromobutane	215.89		174	1.807	632
690	C ₂ H ₄ Br ₂	1, 4-Dibromobutane Br(CH ₂) ₄ Br	215.89	-20	198 d.	1.79 ¹⁴	
691	C ₂ H ₄ Br ₂	2, 3-Dibromobutane CH ₃ (CHBr) ₂ CH ₃	215.89		158	1.83 ⁹	
693	C ₂ H ₄ Br ₂	1, 2-Dibromo-2-methylpropane	215.89	-70.3	149.0	1.759	639
694	C ₂ H ₄ Br ₂ S	Di-(1-bromoethyl) sulfide	247.96		87 ¹⁸	1.732	
695	C ₂ H ₄ Cl ₂	1, 2-Dichloro-2-methylpropane	126.98		108		
696	C ₂ H ₄ Cl ₂ O	2-Chloroethyl ether (ClCH ₂ CH ₂) ₂ O	142.98		178	1.213 ²⁰	461
697	C ₂ H ₄ Cl ₂ O	1, 2-Dichloroethyl ethyl ether	142.98		145	1.171 ²³	
697.1	C ₂ H ₄ Cl ₂ O ₂	Dichlorobutylene glycol	158.98	126			1177
698	C ₂ H ₄ Cl ₂ S	Di-(1-chloroethyl) sulfide	159.04		67.5 ²⁷	1.199 ¹⁴	
699	C ₂ H ₄ Cl ₂ S	Di-(2-chloroethyl) sulfide (CH ₂ CHCl) ₂ S	159.04	13.5	120 ¹⁴	1.285 ¹⁴	701
700	C ₂ H ₄ Cl ₂ OS	Di-(2-chloroethyl) sulfoxide	175.04	110	140 ¹⁴ d.		
701	C ₂ H ₄ Cl ₂ O ₂ S	Di-(2-chloroethyl) sulfone	191.04	53.5	181 ¹⁴		
702	C ₂ H ₄ N ₂	2-Methyl-4, 5-dihydroimidazole	84.078	106	198		
703	C ₂ H ₄ N ₂ O ₂	1-Acetyl-2-methylurea	116.08	180			
704	C ₂ H ₄ N ₂ O ₂	Dimethylloxamide (CONHCH ₃) ₂	116.08	210			
705	C ₂ H ₄ N ₂ O ₂	Dimethylglyoxime	116.08	246			
706	C ₂ H ₄ N ₂ O ₂	Succinamide (CH ₂ CONH ₂) ₂	116.078	243			
707	C ₂ H ₄ N ₂ O ₂	Ethyl allophanate H ₂ NCONHCO ₂ C ₂ H ₅	132.08	192			
708	C ₂ H ₄ N ₂ O ₂	L-Asparagine	132.08	226	235 d.	1.543 ¹⁵	1254
709	C ₂ H ₄ N ₂ O ₂	d-Tartaramide [CH(OH)CONH ₂] ₂	148.08	195			
710	C ₂ H ₄ N ₂ S	Allylthiourea CH ₂ :CHCH ₂ NHCONH ₂	116.143	78.4		1.219 ²⁰	
711	C ₂ H ₄ O	Crotonyl alcohol CH ₂ :CHCH ₂ CH ₂ OH	72.062	> -30	118	0.854	276
712	C ₂ H ₄ O	Cyclobutanol (CH ₂) ₃ CHOH	72.062		124.1	0.923 ¹⁸	343
713	C ₂ H ₄ O	Cyclopropyl carbinol (CH ₂) ₂ CHCH ₂ OH	72.062		124.3	0.899	850
714	C ₂ H ₄ O	Vinylethyl alcohol CH ₂ :CHCH ₂ CH ₂ OH	72.062		114	0.850 ⁹	
715	C ₂ H ₄ O	Methyl allyl ether CH ₂ :CHCH ₂ OCH ₃	72.062		46	0.77 ¹¹	
716	C ₂ H ₄ O	Vinyl ethyl ether CH ₂ :CHOC ₂ H ₅	72.062		35.5	0.763 ^{14, 16}	
717	C ₂ H ₄ O	n-Butyraldehyde C ₂ H ₅ CHO	72.062	-99.0	75.7	0.817	50
718	C ₂ H ₄ O	Isobutyraldehyde (CH ₃) ₂ CHCHO	72.062	-65.9	61	0.794	30
719	C ₂ H ₄ O	Methyl ethyl ketone CH ₃ COC ₂ H ₅	72.062	-86.4	79.6	0.805	40
720	C ₂ H ₄ O ₂	Erythrol	88.062		196.5	1.047	
721	C ₂ H ₄ O ₂	Methylacetyl carbinol (Acetoin)	88.062	15	142	1.002 ¹⁸	303
722	C ₂ H ₄ O ₂	2-Hydroxybutyraldehyde (Aldol)	88.062		83 ²⁰	1.103	
723	C ₂ H ₄ O ₂	n-Butyric acid C ₂ H ₅ CO ₂ H	88.062	-7.9	163.5	0.959	109
724	C ₂ H ₄ O ₂	Isobutyric acid (CH ₃) ₂ CHCO ₂ H	88.062	-47.0	154.4	0.949	88

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No
725	C ₄ H ₈ O ₂	Ethyl acetate CH ₃ COOC ₂ H ₅	88.062	-83.6	77.1	0.899	29
726	C ₄ H ₈ O ₂	Methyl propionate C ₃ H ₇ CO ₂ CH ₃	88.062	-87.5	79.9	0.917	36
727	C ₄ H ₈ O ₂	<i>n</i> -Propyl formate HCO ₂ C ₃ H ₇	88.062	-92.9	81.3	0.901	35
728	C ₄ H ₈ O ₂	Isopropyl formate HCO ₂ CH(CH ₃) ₂	88.062		71.3	0.883 ^o	
729	C ₄ H ₈ O ₂	Ethoxyacetic acid C ₂ H ₅ OCH ₂ CO ₂ H	104.062		206		
730	C ₄ H ₈ O ₂	1-Hydroxybutyric acid	104.062	42.5	260		
731	C ₄ H ₈ O ₂	1-Hydroxyisobutyric acid	104.062	79	212		
732	C ₄ H ₈ O ₂	2-Hydroxybutyric acid	104.062		130 ¹⁴		
733	C ₄ H ₈ O ₂	Ethyl glycolate HOCH ₂ CO ₂ C ₂ H ₅	104.062		160	1.083 ²¹	
734	C ₄ H ₈ O ₂	Glycol acetate HOCH ₂ CH ₂ OCOCH ₃	104.062		182		
735	C ₄ H ₈ O ₂	Methylethyl carbonate CH ₃ (C ₂ H ₅) ₂ CO ₂	104.062	-14.5	109.2	1.002 ²⁷	
736	C ₄ H ₈ O ₂	Methyl hydrazylate	104.062		79 ¹²	1.118	336
737	C ₄ H ₈ O ₂	Methyl lactate CH ₃ CH(OH)CO ₂ CH ₃	104.062		144.8	1.08 ¹⁶	883
738	C ₄ H ₈ O ₂	1, 2-Dihydroxybutyric acid	120.06	75			
739	C ₄ H ₈ O ₂	<i>d</i> -Methyl glycerinate	120.06		120 ¹⁴	1.280 ¹¹	
740	C ₄ H ₈ S ₂	Diethylene disulfide	120.192	112	200		
741	C ₄ H ₉ Br	<i>n</i> -Butyl bromide C ₄ H ₉ Br	136.99	-112.4	101.6	1.275	372
742	C ₄ H ₉ Br	Isobutyl bromide (CH ₃) ₂ CHCH ₂ Br	136.99	-118.5	91.5	1.264	352
743	C ₄ H ₉ Br	<i>sec</i> -Butyl bromide C ₂ H ₅ CHBrCH ₃	136.99		91.3	1.251 ²⁵	347
744	C ₄ H ₉ Br	<i>tert</i> -Butyl bromide (CH ₃) ₃ CBr	136.99	-20	73.3	1.222	309
745	C ₄ H ₉ BrO	2-Bromoethyl ethyl ether	152.99		128.2	1.370 ^o	
746	C ₄ H ₉ Cl	<i>n</i> -Butyl chloride C ₄ H ₉ Cl	92.527	-123.1	78.0	0.884	132
747	C ₄ H ₉ Cl	Isobutyl chloride (CH ₃) ₂ CHCH ₂ Cl	92.527	-131.2	68.9	0.875	98
748	C ₄ H ₉ Cl	<i>sec</i> -Butyl chloride C ₂ H ₅ CHClCH ₃	92.527		68	0.871	110
749	C ₄ H ₉ Cl	<i>tert</i> -Butyl chloride (CH ₃) ₃ CCl	92.527	-28.5	51.0	0.840	60
751	C ₄ H ₉ ClO	1-Chloroethyl ethyl ether	108.527		98		
752	C ₄ H ₉ ClO	<i>tert</i> -Butyl hypochlorite (CH ₃) ₃ CClO	108.527		80	0.958	
753	C ₄ H ₉ ClS	2-Chloroethyl ethyl sulfide	124.59		157		
754	C ₄ H ₉ I	<i>n</i> -Butyl iodide C ₄ H ₉ I	184.00	-103.5	127	1.617	600
755	C ₄ H ₉ I	Isobutyl iodide (CH ₃) ₂ CHCH ₂ I	184.00	-93.5	120.4	1.605	578
756	C ₄ H ₉ I	<i>sec</i> -Butyl iodide C ₂ H ₅ CHICH ₃	184.00	-104.0	117.5	1.595	
757	C ₄ H ₉ IO	2-Iodoethyl ethyl ether C ₂ H ₅ OCH ₂ CH ₂ I	200.00		155	1.670	
758	C ₄ H ₉ N	Crotonylamine CH ₃ CH=CHCH ₂ NH ₂	71.077		81		
759	C ₄ H ₉ N	Tetrahydropyrrole (Pyrrolidine)	71.077		88.5	0.871 ¹⁰	
760	C ₄ H ₉ NO	<i>n</i> -Butylamine C ₄ H ₉ CONH ₂	87.077	116	216	1.032	
761	C ₄ H ₉ NO	Isobutylamine (CH ₃) ₂ CHCONH ₂	87.077	129	220	1.013	
762	C ₄ H ₉ NO	<i>N</i> -Dimethylacetamide CH ₃ CON(CH ₃) ₂	87.077		165.7	0.943	365
763	C ₄ H ₉ NO	<i>N</i> -Ethylacetamide CH ₃ CONHC ₂ H ₅	87.077		205	0.942	
764	C ₄ H ₉ NO	Methyl ethyl ketoxime	87.077		152	0.923	393
765	C ₄ H ₉ NO ₂	Immoethyl alcohol HN(CH ₂ CH ₂ O ₂ H) ₂	103.077	28	270		
766	C ₄ H ₉ NO ₂	1-Aminobutyric acid	103.077	285			
767	C ₄ H ₉ NO ₂	2-Aminobutyric acid	103.077	184			
768	C ₄ H ₉ NO ₂	3-Aminobutyric acid	103.08	193			
769	C ₄ H ₉ NO ₂	1-Aminoisobutyric acid	103.077		280		
770	C ₄ H ₉ NO ₂	Ethylammonioacetic acid	103.08	> 160			
771	C ₄ H ₉ NO ₂	Propyl carbamate C ₃ H ₇ OCONH ₂	103.077	53	200		
772	C ₄ H ₉ NO ₂	<i>n</i> -Butyl nitrite C ₄ H ₉ ONO	103.077		75	0.911 ^o	
773	C ₄ H ₉ NO ₂	Isobutyl nitrite (CH ₃) ₂ CHCH ₂ ONO	103.077		67	0.877 ¹⁶	28
773 1	C ₄ H ₉ NO ₂	Methy urethane CH ₃ NHCO ₂ C ₂ H ₅	103.077		170	1.009 ^{18, 9}	950
774	C ₄ H ₉ NO ₂	<i>n</i> -Butyl nitrate C ₄ H ₉ ONO ₂	119.077		136	1.048 ^o	
775	C ₄ H ₉ NO ₂	Isobutyl nitrate (CH ₃) ₂ CHCH ₂ ONO ₂	119.077		122.9	1.014 ²¹	137
776	C ₄ H ₉ NO ₄	<i>d</i> -Ammonium hydrogen malate	151.077	170			1205
777	C ₄ H ₉ NO ₄	<i>l</i> -Ammonium hydrogen malate	151.077	161		1.509	
778	C ₄ H ₉ NO ₄	Ammonium hydrogen tartrate	167.077	d.		1.680	1241
779	C ₄ H ₉ NS	1, 4-Thiazan	103.142		169		
780	C ₄ H ₉ N ₂ O ₂	Creatine	131.093	295			
781	C ₄ H ₁₀ ClNO ₂	Ethylammonioacetic acid hydrochloride	139.54	144			
781 1	C ₄ H ₁₀	<i>n</i> -Butane CH ₃ CH ₂ CH ₂ CH ₃	58.077	-135.0	0.6	0.601 ^o (liq.)	
781 2	C ₄ H ₁₀	Trimethylmethane (Isobutane)	58.077	-145.0	-10.2		
782	C ₄ H ₁₀ N ₂	Diethylenediamine (Piperazine)	86.093	105.6	146		1156
783	C ₄ H ₁₀ N ₂ O	Nitrosodiethylamine (C ₂ H ₅) ₂ NNO	102.093		175.4	0.951 ^{17, 8}	
784	C ₄ H ₁₀ N ₂ O	Trimethylurea (CH ₃) ₃ NCONHCH ₃	102.093	75.5	232.5		
785	C ₄ H ₁₀ N ₂ S	Propylthiourea C ₃ H ₇ NHCSNH ₂	118.16	110			

C-TABLE: C₆H₁₀ TO C₈H₈

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No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
786	C ₆ H ₁₀ N ₄ O ₂	Guanidine lactate	132.10	d.			1236
788	C ₆ H ₁₀ N ₄ S ₂	Ethylenediamine thiocyanate	178.24				1285
789	C ₆ H ₁₀ O	<i>n</i> -Butyl alcohol C ₄ H ₉ OH	74.077	-89.8	117.7	0.810	116
790	C ₆ H ₁₀ O	Isobutyl alcohol (CH ₃) ₂ CHCH ₂ OH	74.077	-108	107.3	0.802	99
791	C ₆ H ₁₀ O	<i>sec</i> -Butyl alcohol C ₂ H ₅ CH(OH)CH ₃	74.077		99.5	0.808	104
792	C ₆ H ₁₀ O	<i>tert</i> -Butyl alcohol (CH ₃) ₃ COH	74.077	25.5	82.8	0.789	64
793	C ₆ H ₁₀ O	Ether (C ₂ H ₅) ₂ O	74.077	α -116.3 β -123.3	34.5	0.714	7
794	C ₆ H ₁₀ O	Methyl propyl ether CH ₃ OC ₃ H ₇	74.077		38.9	0.738	13
794 1	C ₆ H ₁₀ O	Methyl isopropyl ether	74.077		32.5 ¹⁷	0.735 ¹⁰	12
795	C ₆ H ₁₀ O ₂	1, 4-Dihydroxybutane (CH ₂ CH ₂ OH) ₂	90.077	16	230	1.020	
796	C ₆ H ₁₀ O ₂	2, 3-Dihydroxybutane (CH ₃ CHOH) ₂	90.077		184	1.018 ⁹	
797	C ₆ H ₁₀ O ₂	1, 2-Dihydroxy-2-methylpropane	90.077		177	1.003	
798	C ₆ H ₁₀ O ₂	Glycol dimethyl ether (CH ₃ OCCH ₃) ₂	90.077		84.5	0.873	
799	C ₆ H ₁₀ O ₂	Glycol ethyl ether HOCH ₂ CH ₂ OC ₂ H ₅	90.077		135.3	0.935	
800	C ₆ H ₁₀ O ₂	Diethyl peroxide (C ₂ H ₅ O) ₂	90.077		65	0.827	
801	C ₆ H ₁₀ O ₂	Dimethyl acetal CH ₃ CH(OCCH ₃) ₂	90.077		64.4	0.860	
802	C ₆ H ₁₀ O ₂ S	Ethyl sulfone (C ₂ H ₅) ₂ SO ₂	122.142	70	248	1.357	
803	C ₆ H ₁₀ O ₂ S ₂	Diethyl disulfoxide C ₂ H ₅ (SO) ₂ C ₂ H ₅	154.21		140 d.	1.24	
804	C ₆ H ₁₀ O ₃	1, 2, 3-Trihydroxybutane	106.077		136 ²⁸	1.232 ¹⁷	
805	C ₆ H ₁₀ O ₃	Di-(2-hydroxyethyl) ether	106.077		250	1.132	
806	C ₆ H ₁₀ O ₃	Glycerol 1-methyl ether	106.077		197	1.270 ¹⁸	
807	C ₆ H ₁₀ O ₃ S	Diethyl sulfite (C ₂ H ₅) ₂ SO ₃	138.14		161.3	1.077	811
808	C ₆ H ₁₀ O ₄	<i>dl</i> -Erythritol HOCH ₂ (CHOH) ₂ CH ₂ OH	122.08	126	331	1.451	1174
809	C ₆ H ₁₀ O ₄ S	Diethyl sulfite (C ₂ H ₅) ₂ SO ₃	154.14	-26.0	208 s. d.	1.172 ¹⁹	78
810	C ₆ H ₁₀ S	<i>n</i> -Butyl mercaptan C ₄ H ₉ SH	90.142	> -74	98	0.830 ²⁰	
811	C ₆ H ₁₀ S	Isobutyl mercaptan (CH ₃) ₂ CHCH ₂ SH	90.142	< -79	88	0.836	368
812	C ₆ H ₁₀ S	<i>sec</i> -Butyl mercaptan C ₂ H ₅ CH(SH)CH ₃	90.142		85	0.830 ¹⁷	
813	C ₆ H ₁₀ S	<i>tert</i> -Butyl mercaptan (CH ₃) ₃ CSH	90.142		67		
814	C ₆ H ₁₀ S	Ethyl sulfide (C ₂ H ₅) ₂ S	90.142	-102.1	91.6	0.837	300
815	C ₆ H ₁₀ S ₂	Ethyl disulfide (C ₂ H ₅) ₂ S ₂	122.21		153.5	0.993	630
816	C ₆ H ₁₀ Se	Ethyl selenide (C ₂ H ₅) ₂ Se	137.28		108	1.230 ¹⁷	1035
817	C ₆ H ₁₀ Te	Ethyl telluride (C ₂ H ₅) ₂ Te	185.58		138		
818	C ₆ H ₁₁ AsO ₂	Diethylarsonic acid (C ₂ H ₅) ₂ AsO(OH)	166.05	190			
819	C ₆ H ₁₁ AsO ₃	<i>N</i> -Butylarsonic acid C ₄ H ₉ AsO(OH) ₂	182.05	159			
820	C ₆ H ₁₁ N	<i>n</i> -Butylamine C ₄ H ₉ NH ₂	73.093	-50.5	76	0.740 ²⁰	131
821	C ₆ H ₁₁ N	Isobutylamine (CH ₃) ₂ CHCH ₂ NH ₂	73.093	-85.5	68	0.736	111
822	C ₆ H ₁₁ N	<i>sec</i> -Butylamine C ₂ H ₅ CH(NH ₂)CH ₃	73.093	-104.5	63	0.718 ²⁰	93
823	C ₆ H ₁₁ N	<i>tert</i> -Butylamine (CH ₃) ₃ CNH ₂	73.093	-67.5	43.8	0.690	39
824	C ₆ H ₁₁ N	Diethylamine (C ₂ H ₅) ₂ NH	73.093	-50.0	56.0	0.711	65
825	C ₆ H ₁₁ P	Diethylphosphine (C ₂ H ₅) ₂ PH	90.109		85		
826	C ₆ H ₁₂ As ₂	Caeodyl (CH ₃) ₂ As ₂ As(CH ₃) ₂	210.01	-6	170	> 1	
827	C ₆ H ₁₂ As ₂ O	Caeodylic oxide [(CH ₃) ₂ As] ₂ O	226.01	-25	120	1.462 ¹⁶	
828	C ₆ H ₁₂ As ₂ S	Caeodylic sulfide [(CH ₃) ₂ As] ₂ S	242.08		211		
829	C ₆ H ₁₂ BrN	Tetramethylammonium bromide	154.02			1.56	
830	C ₆ H ₁₂ BrNO	Diethylbromoacetamide	170.02	67			
831	C ₆ H ₁₂ ClN	Diethylamine hydrochloride	109.56	217	330	1.048	
832	C ₆ H ₁₂ ClN	Tetramethylammonium chloride	109.56			1.169	
833	C ₆ H ₁₂ N ₄	Tetramethylenediamine	88.108	27	158		
834	C ₆ H ₁₂ N ₄ O ₄	Ammonium succinate	152.11		d.	1.367 ¹⁰	1253
835	C ₆ H ₁₂ N ₄ O ₆	Ammonium <i>d</i> -tartrate	184.11			1.608	
835 1	C ₆ H ₁₂ N ₄ O ₆	Ammonium <i>dl</i> -tartrate	184.11			1.601	1323
836	C ₆ H ₁₂ N ₄	Tetramethylammonium trinitride	116.124	125 d.			
837	C ₆ H ₁₂ OS	Dimethylethylsulfonium hydroxide	108.15	-99.5	93	0.837	
838	C ₆ H ₁₃ NO	Tetramethylammonium hydroxide	91.108	63	d.		
839	C ₆ H ₁₄ N ₄ O ₆ S	Methylguanidine sulfate	244.24	240			
840	C ₆ HCl ₂ N ₄	2, 6, 8-Trichloropurine	223.41	187			
841	C ₆ HCl ₂ N	2, 3, 4, 5-Tetrachloropyridine	216.85	21	137 ²⁴		
842	C ₆ HCl ₂ N	2, 3, 4, 6-Tetrachloropyridine	216.85	75	135 ²⁰		
843	C ₆ HCl ₂ N	2, 3, 5, 6-Tetrachloropyridine	216.85	91	130 ²⁰		
844	C ₆ H ₂ Cl ₃ N	2, 3, 5-Trichloropyridine	182.40	50	120 ¹⁶		
845	C ₆ H ₂ Cl ₃ N	3, 5-Dichloropyridine	147.96	67			
846	C ₆ H ₂ N ₄	1, 1, 1-Tricyanoethane CH ₃ C(CN) ₃	105.05	93.5		0.760	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
847	C_5H_5BrN	3-Bromopyridine	157.96		173	1.632 ¹⁰	
848	C_5H_4ClN	2-Chloropyridine	113.50		167.5	1.205 ¹⁶	
849	C_5H_4ClN	3-Chloropyridine	113.50		148.5		
850	C_5H_4ClN	4-Chloropyridine	113.50		148		
851	$C_5H_5N_2$	Glutaconic nitrile $NCCH_2CH=CHCN$	92.047	31.5	130 ¹²		
852	$C_5H_4N_2O_4$	3-Nitropyridine	124.05	41	216		
853	$C_5H_4N_2O_4$	Methylalloxan	156.05	156 d.			
853.1	$C_5H_4N_2O_4 (H_2O)$	3, 5-Pyrazoledicarboxylic acid	156.05			1.626	1239
854	$C_5H_4N_4$	Purine	120.06	217			
855	$C_5H_4N_4O$	Hypoxanthine	136.06	> 150			
857	$C_5H_4N_4O_3$	Uric acid	168.06	d.		1.893	
858	C_5H_4OS	Thiophene-2-aldehyde	112.10		198	1.215	
859	$C_5H_4O_2$	Furfural	96.031	-38.7	161.7		685
860	$C_5H_4O_2$	1, 4-Pyrone	96.031	32.5	217.7	1.190 ¹⁰	1063
861	$C_5H_4O_2S$	Thiophene-2-carboxylic acid	128.10	126.5	260 d.		
862	$C_5H_4O_2S$	Thiophene-3-carboxylic acid	128.10	136			
863	$C_5H_4O_3$	Citraconic anhydride	112.03	7	228	1.245	508
864	$C_5H_4O_3$	Glutaconic anhydride	112.03	87	152 ¹⁵		
865	$C_5H_4O_3$	Itaconic anhydride	112.03	68			
866	$C_5H_4O_3$	Pyromeconic acid	112.03	117	228		
867	$C_5H_4O_3$	Pyromucic acid	112.03	133			
868	$C_5H_4O_4$	Acetic acid	128.03	164			1324
869	$C_5H_4O_4$	Glutamic acid $HO_2CCH_2CO_2H$	128.03	146			
870	C_5H_5N	Pyridine	79.047	-42	115.3	0.982	641
871	C_5H_5NO	2-Hydroxypyridine	95.047	107	281		
872	C_5H_5NO	3-Hydroxypyridine $HOCH_2H_4N$	95.047	129			
873	C_5H_5NO	4-Hydroxypyridine	95.047	148.5			
874	C_5H_5NO	Pyrrole-2-aldehyde $CHOCH_2H_4N$	95.047	47			
875	$C_5H_5NO_2$	2, 4-Dihydroxypyridine $(HO)_2C_3H_3N$	111.05	265			
876	$C_5H_5NO_2$	2, 6-Dihydroxypyridine $(HO)_2C_3H_3N$	111.05	195			
877	$C_5H_5NO_2$	Pyrrole-2-carboxylic acid $HO_2CCH_2H_4N$	111.05	191.5			
878	$C_5H_5NO_2$	2, 4, 6-Trihydroxypyridine	127.05	230 d.			
879	$C_5H_5N_6$	Adenine	135.08	365			
880	C_5H_6	Cyclopentadiene	66.046		42.5	0.805	903
881	C_5H_6	2-Methyl-1, 3-butadiene (Valylene)	66.046		50		
882	$C_5H_6N_2$	2-Aminopyridine	94.062	56	204		
883	$C_5H_6N_2$	3-Aminopyridine	94.062	64	252		
884	$C_5H_6N_2$	4-Aminopyridine $H_2NC_3H_3N$	94.062	157			
886	$C_5H_6N_2$	Glutaric nitrile $NC(CH_2)_3NC$	94.062	-29	287.4	0.995 ¹⁴	1007
887	$C_5H_6N_2O$	2-Hydroxyglutaric nitrile	110.06		203 ¹¹	1.181	534
888	$C_5H_6N_2O_4$	Thymine	126.06	335 d.			
889	$C_5H_6N_2O_4$	Dimethylparabanic acid	142.06	145	277		
890	$C_5H_6N_2O_4$	Pyridine nitrate	142.06				1333
891	C_5H_6O	2-Methylfurfuran	82.046		64.3	0.916	
892	C_5H_6OS	Thiophene-2-alcohol	114.11		207		
893	$C_5H_6O_2$	Furfuryl alcohol	98.046		170.2	1.136	996
894	$C_5H_6O_2$	Pentonic acid	98.046	103			
895	$C_5H_6O_2$	Ethyl propiolate $CH_3CO_2C_2H_5$	98.046		119.5	0.968 ¹⁵	
896	$C_5H_6O_2$	Propargyl acetate $CH_3COCH_2O_2CCH_3$	98.046		125	1.005	252
897	$C_5H_6O_3$	Glutaric anhydride	114.05	57	287		
898	$C_5H_6O_4$	Citraconic acid $CH_3C(CO_2H)CHCO_2H$	130.05	91		1.617	
899	$C_5H_6O_4$	Glutaconic acid	130.05	134			
900	$C_5H_6O_4$	Itaconic acid $CH_3C(CO_2H)CH_2CO_2H$	130.05	161 d.		1.632	
901	$C_5H_6O_4$	Mesaconic acid $CH_3(CO_2H)CCHCO_2H$	130.05	202	250		
902	$C_5H_6O_4$	Paraconic acid	130.05	58			
903	$C_5H_6O_4$	Trimethylene-1, 1-dicarboxylic acid	130.05	175	210 ³⁰		
904	$C_5H_6O_4$	Acetone-1, 1'-dicarboxylic acid	146.05	135 d.			
905	$C_5H_6O_4$	1-Ketoglutaric acid	146.05	113			
906	$C_5H_6N_2O_3$	1-Methylbarbituric acid	142.06	132			
907	$C_5H_7ClO_2$	Chloral acetone	205.43	76			
908	C_5H_7N	1-Methylpyrrole	81.062		115.4	0.911	892
909	C_5H_7N	2-Methylpyrrole	81.062		148	0.945	
910	C_5H_7N	3-Methylpyrrole	81.062		143		

No	Formula	Name	Mol. wt	M. P.	B. P.	d	R. I. No.
911	C ₅ H ₈ NO ₂	Ethyl cyanoacetate NCCH ₂ CO ₂ C ₂ H ₅	113.06	-22.5	206	1.063	232
912	C ₅ H ₇ NS	Crotonyl isothiocyanate	113.13		85 ¹⁰	0.993 ⁹	
913	C ₅ H ₈	Cyclopentene	68.082		43.6	0.776	
914	C ₅ H ₈	2, 3-Pentadiene CH ₃ CH=C:CHCH ₃	68.082		51	0.702	
915	C ₅ H ₈	unsym.-Dimethylallene (CH ₃) ₂ C=C=CH ₂	68.062	-120	40.5	0.678	
916	C ₅ H ₈	Isoprene CH ₂ :C(CH ₃)CH=CH ₂	68.062	-120	34	0.679	943
917	C ₅ H ₈	Methylethylacetylene CH ₃ CC ⁺ C ₂ H ₅	68.062		56	0.687	121
918	C ₅ H ₈	1, 3-Pentadiene CH ₃ CH:CHCH ₂ CH ₂	68.062		44	0.696	901
920	C ₅ H ₈	Propylacetylene C ₃ H ₇ C ⁺ CH	68.062	-95	40	0.722 ⁹	932
921	C ₅ H ₈	Isopropylacetylene (CH ₃) ₂ CHC ⁺ CH	68.062		29.3	0.685 ⁹	
921 1	C ₅ H ₈ Cl ₂ O ₂	Ethyl 1, 2-dichloropropionate	170.98		184	1.246	424
921 2	C ₅ H ₈ N ₂	3, 4-Dimethylpyrazole	96.078	58		0.933 ^{12, 13}	1131
922	C ₅ H ₈ N ₂	3, 5-Dimethylpyrazole	96.078	107	220		
923	C ₅ H ₈ N ₂ O ₄	Urocanic acid	220.09	162 d			
924	C ₅ H ₈ O	Cyclopentanone	84.062		130.6	0.951	353
925	C ₅ H ₈ O	Ethyl propargyl ether CH ₃ CCCH ₂ OC ₂ H ₅	84.062		80	0.833	325
926	C ₅ H ₈ O	Tiglic aldehyde CH ₃ CH:CH(CH ₃)CHO	84.062		110.5	0.870	430
927	C ₅ H ₈ O	Ethylidenacetone CH ₃ CH:CHCOCH ₃	84.062		124	0.856	370
928	C ₅ H ₈ O ₂	Levulinic aldehyde	100.062		188	1.018	295
929	C ₅ H ₈ O ₂	Acetylacetone CH ₃ COCH ₂ COCH ₃	100.062	-23.2	137	0.976	439
930	C ₅ H ₈ O ₂	Allylacetic acid CH ₂ :CH(CH ₂) ₂ CO ₂ H	100.062	< -18	189	0.984	805
931	C ₅ H ₈ O ₂	Angelie acid	100.062	45	185	0.983 ^{14, 15}	1069
932	C ₅ H ₈ O ₂	2, 2-Dimethylacrylic acid	100.062	70	195		
933	C ₅ H ₈ O ₂	1-Ethylacrylic acid CH ₂ :C(C ₂ H ₅)CO ₂ H	100.062	45	180		
934	C ₅ H ₈ O ₂	1, 2-Pentenic acid C ₂ H ₅ CH:CHCO ₂ H	100.062	10	108 ¹⁷	0.990	904
935	C ₅ H ₈ O ₂	2, 3-Pentenic acid	100.062		95 ¹⁶	0.987	949
936	C ₅ H ₈ O ₂	Tiglic acid CH ₃ CH:CH(CH ₃)CO ₂ H	100.062	64	198.5	0.872	1121
937	C ₅ H ₈ O ₂	Allyl acetate CH ₂ :CHCH ₂ CO ₂ C ₂ H ₅	100.062		105	0.928	146
938	C ₅ H ₈ O ₂	Ethyl acrylate C ₂ H ₅ CO ₂ C ₂ H ₅	100.062		99.8	0.924	
939	C ₅ H ₈ O ₂	Methyl α-crotonate	100.062		120.7	0.981 ⁴	
941	C ₅ H ₈ O ₂	Levulinic acid CH ₃ COCH ₂ CH ₂ CO ₂ H	116.06	33.1	246	1.143 ¹⁷	383
942	C ₅ H ₈ O ₂	Ethyl pyruvate CH ₃ COCO ₂ C ₂ H ₅	116.06		144	1.060 ¹⁸	882
943	C ₅ H ₈ O ₂	Methyl acetoacetate	116.06		170	1.077	241
944	C ₅ H ₈ O ₄	Dimethylmalonic acid (CH ₃) ₂ C(CO ₂ H) ₂	132.06	193			
945	C ₅ H ₈ O ₄	Ethylmalonic acid C ₂ H ₅ CH(CO ₂ H) ₂	132.06	111.5	160 d		
946	C ₅ H ₈ O ₄	Glutaric acid CH ₂ (CH ₂ CO ₂ H) ₂	132.06	97.5	304	1.102 ^{10, 11}	1151
947	C ₅ H ₈ O ₄	Pyrotarturic acid	132.06	111		1.411	1333
947 1	C ₅ H ₈ O ₄	Methyltetronic lactone	132.06	123			1213
948	C ₅ H ₈ O ₄	Dimethyl malonate H ₂ C(CO ₂ CH ₃) ₂	132.06	-62	181.5	1.154	206
949	C ₅ H ₈ O ₄	Ethyl hydrogen malonate	132.06		117 ²¹	1.176	301
950	C ₅ H ₈ O ₄	Methyl ethyl oxalate	132.06		173.7	1.156 ⁹	
951	C ₅ H ₈ O ₄	Methylene diacetate CH ₂ (CO ₂ CH ₃) ₂	132.06		170		
952	C ₅ H ₈ O ₄	α-Citramalic acid	148.06	95			
953	C ₅ H ₈ O ₄	dl-Citramalic acid	148.06	117			
954	C ₅ H ₈ O ₄	β-Methylmalic acid	148.06	123			
955	C ₅ H ₈ O ₄	Arabonic lactone	148.06	98			
956	C ₅ H ₈ O ₄	Dimethyl tartronate	148.06	53.3			
957	C ₅ H ₈ O ₆ (H ₂ O)	d-Methyl hydrogen tartrate	164.06	76			
958	C ₅ H ₈ O ₇	Aposorbinic acid	180.06	110			
959	C ₅ H ₇ BrO ₂	1-Bromovaleric acid C ₂ H ₅ CHBrCO ₂ H	180.99		105 ¹⁰		
960	C ₅ H ₇ BrO ₂	2-Bromovaleric acid	180.99	60			
961	C ₅ H ₇ BrO ₂	3-Bromovaleric acid	180.99	40			
962	C ₅ H ₇ BrO ₂	2-Bromoisovaleric acid	180.99	73.5			
963	C ₅ H ₇ BrO ₂	Ethyl 1-bromopropionate	180.99		160	1.393	419
964	C ₅ H ₇ Br ₃	1, 2, 3-Tribromopentane	308.82	128 ²¹		2.095 ^{14, 15}	743
965	C ₅ H ₇ Cl	Isoprene hydrochloride	104.53	109		0.933	
966	C ₅ H ₇ ClO	n-Valeryl chloride C ₄ H ₉ COCl	120.53	128		1.016 ¹⁸	223
967	C ₅ H ₇ ClO	Isovaleryl chloride (CH ₃) ₂ CHCH ₂ COCl	120.53	113			
968	C ₅ H ₇ ClO ₂	Ethyl 1-chloropropionate	136.53		146	1.087	235
969	C ₅ H ₇ ClO ₂	Ethyl 2-chloropropionate	136.53		162.5	1.114	236
969 1	C ₅ H ₇ ClO ₂	n-Butyl chloroformate ClCO ₂ C ₄ H ₉	136.53		138.9	1.078	807
970	C ₅ H ₇ ClO ₂	Isobutyl chloroformate	136.53		130	1.040 ²²	
971	C ₅ H ₇ IO ₂	Ethyl 2-iodopropionate	228.00		202	1.679 ¹⁸	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No
972	C_4H_5N	<i>n</i> -Valeryl nitrile C_4H_5CN	83.077		141	0.801	82
973	C_4H_5NO	Isovaleryl nitrile $(CH_3)_2CHCH_2CN$	83.077		129.3	0.802	
974	C_4H_9NO	Piperidone	99.077	40	256		
975	$C_4H_9NO_2$	Acetylurethane $CH_3CONHCO_2C_2H_5$	131.08	78	215		
975.1	$C_4H_9NO_2$	α -Acetylaminopropionic acid	131.08	133			1215
976	$C_4H_9NO_2$	<i>dl</i> -Glutamine acid	147.08	198		1.460	1261
977	$C_4H_9NO_2$	<i>d</i> -Glutamine acid	147.08	208 d.		1.538	1266
978	C_4H_9NS	Isobutyl isothiocyanate	115.14		162	0.943	
979	C_5H_{10}	Cyclopentane $CH_2<(CH_2CH_2)_2>$	70.077	-93.3	49.5	0.754	843
980	C_5H_{10}	1, 4-Dimethyltrimethylene	70.077		21	0.660	
981	C_5H_{10}	Methylcyclobutane	70.077		42		
982	C_5H_{10}	β -Amylene $CH_3CH=CHC_2H_5$	70.077	-139	36.4	0.651	921
983	C_5H_{10}	α -Amylene $C_2H_5C(CH_3)=CH_2$	70.077		32	0.667 ⁰	880
984	C_5H_{10}	<i>n</i> -Propylethylene $C_3H_7CH=CH_2$	70.077		40		31
985	C_5H_{10}	2-Methyl-3-butene $CH_3CH=CH(CH_3)_2$	70.077	-135	20.1	0.632 ¹⁵	
986	C_5H_{10}	2-Methyl-2-butene $CH_3C(CH_3)=CH_2$	70.077	-124	38.4	0.668 ¹⁵	
987	$C_5H_{10}Br_2$	1, 5-Dibromopentane $CH_2(CH_2CH_2Br)_2$	229.91	-35	224	1.706 ¹⁸	
988	$C_5H_{10}Br_2$	2, 3-Dibromopentane $C_2H_4(CHBr)_2CH_3$	229.91		175	1.7087 ⁰	866
988.1	$C_5H_{10}ClNO_2$	<i>dl</i> (-)-Glutamine acid hydrochloride	183.54	193			1240
989	$C_5H_{10}Cl_2$	3, 3-Dichloro-2-methylbutane	140.99		145	1.065	
990	$C_5H_{10}Cl_2$	1, 4-Dichloropentane	140.99		61 ¹⁷		
991	$C_5H_{10}Cl_2$	1, 5-Dichloropentane $CH_2(CH_2CH_2Cl)_2$	140.99		178		
992	$C_5H_{10}Cl_2$	2, 3-Dichloropentane $C_2H_4(CHCl)_2CH_3$	140.99		139		
993	$C_5H_{10}N_2$	Diethyleuanamide $NCN(C_2H_5)_2$	98.093		187 d.	0.854	1072
994	$C_5H_{10}N_2O_2$	1-Nitropiperidine	130.09	-5.5	245	1.158	1033
994.1	$C_5H_{10}N_2O_2$	Dimethyladonamide	130.09		198		1208
995	$C_5H_{10}N_2O_3$	<i>dl</i> -Glutamine	146.09	256			
996	$C_5H_{10}N_2O_4$	Amylene nitrosate	162.09	99			1207
997	$C_5H_{10}O$	Cyclopentanol	86.077		141	0.946	
998	$C_5H_{10}O$	Methylallyl carbinol	86.077		116.4	0.834	
999	$C_5H_{10}O$	Vinylethyl carbinol	86.077		114.7	0.837	277
1000	$C_5H_{10}O$	2-Pentene-1-ol	86.077		64 ²²	0.838	933
1001	$C_5H_{10}O$	Ethyl allyl ether $C_2H_5OCH_2CH=CH_2$	86.077		67.6	0.765	69
1002	$C_5H_{10}O$	Isovaleraldehyde $(CH_3)_2CHCH_2CHO$	86.077	-51	92.5	0.803 ¹⁷	79
1003	$C_5H_{10}O$	Trimethylacetaldehyde $(CH_3)_3CCHO$	86.077	3	75	0.793	
1004	$C_5H_{10}O$	<i>n</i> -Valeraldehyde C_4H_9CHO	86.077		103.4	0.819 ¹¹	70
1005	$C_5H_{10}O$	Diethyl ketone $(C_2H_5)_2CO$	86.077	-42.0	101.7	0.814	86
1006	$C_5H_{10}O$	Methyl propyl ketone $CH_3COCH_2C_2H_5$	86.077	-77.8	101.7	0.812 ¹⁵	75
1007	$C_5H_{10}O$	Methyl isopropyl ketone	86.077	-92.0	93	0.815 ¹⁵	62
1008	$C_5H_{10}O$	Pentamethylene oxide	86.077		87	0.880 ⁰	
1009	$C_5H_{10}O_2$	3-Acetylpropyl alcohol	102.08		209	1.016 ⁰	
1010	$C_5H_{10}O_2$	<i>dl</i> -Methylethylacetic acid	102.08	< -80	174	0.941	153
1011	$C_5H_{10}O_2$	Trimethylacetic acid $(CH_3)_3CCO_2H$	102.08	35.5	163.8	0.905 ³⁰	1050
1012	$C_5H_{10}O_2$	<i>n</i> -Valeric acid $C_4H_9CO_2H$	102.08	-59; -31.5	187.0	0.942	175
1013	$C_5H_{10}O_2$	Isovaleric acid $(CH_3)_2CHCH_2CO_2H$	102.08	-37.6	176.7	0.937 ¹⁵	145
1014	$C_5H_{10}O_2$	<i>n</i> -Butyl formate $HCO_2C_4H_9$	102.08	-90.0	106.8	0.911 ⁰	74
1015	$C_5H_{10}O_2$	<i>d</i> -sec-Butyl formate	102.08		97	0.882	48
1016	$C_5H_{10}O_2$	Isobutyl formate $(CH_3)_2CHCH_2CO_2H$	102.08	-95.3	98.2	0.875	58
1017	$C_5H_{10}O_2$	Ethyl propionate $C_2H_5CO_2C_2H_5$	102.08	-72.6	99.1	0.891	51
1018	$C_5H_{10}O_2$	Methyl <i>n</i> -butyrate $C_4H_9CO_2CH_3$	102.08	< -95	102.3	0.898	68
1019	$C_5H_{10}O_2$	Methyl isobutyrate $(CH_3)_2CHCO_2CH_3$	102.08	-84.7	92.6	0.891	49
1020	$C_5H_{10}O_2$	<i>n</i> -Propyl acetate $CH_3CO_2C_3H_7$	102.08	-92.5	101.6	0.887	52
1021	$C_5H_{10}O_2$	Isopropyl acetate $CH_3COCH_2(CH_3)_2$	102.08	-73.4	89	0.877 ^{15, 6}	
1022	$C_5H_{10}O_2S$	Ethyl thiocarbonate $CS(OC_2H_5)_2$	134.14		162	1.028	939
1023	$C_5H_{10}O_3$	1-Hydroxyvaleric acid	118.08	31			
1024	$C_5H_{10}O_3$	1-Hydroxyisovaleric acid	118.08	86			
1025	$C_5H_{10}O_3$	2-Hydroxyvaleric acid	118.08	< -32			
1026	$C_5H_{10}O_3$	Diethyl carbonate $(C_2H_5O)_2CO$	118.08	-43.0	125.8	0.979	57
1027	$C_5H_{10}O_3$	Ethyl hydraerylate	118.08		84 ¹²	1.064 ¹⁵	77
1028	$C_5H_{10}O_3$	Ethyl lactate $CH_3CH(OH)CO_2C_2H_5$	118.08		154	1.031	
1028.1	$C_5H_{10}O_3$	Methyl L-1-methoxypropionate	118.08		131	0.9986 ^{15, 4}	892
1029	$C_5H_{10}O_4$	Propyl glycolate $HOCH_2CO_2C_3H_7$	118.08		170.5	1.062 ¹⁵	
1030	$C_5H_{10}O_4$	Ethyl glycerate	134.08		121 ¹⁴	1.191 ¹⁵	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1031	C ₃ H ₁₀ O ₄	Glycerol acetate (Monoacetin)	134.08		158 ¹⁰⁰	1.20	
1032	C ₃ H ₁₀ O ₄	<i>d</i> (l)- α -Arabinose	150.08	150.5		1.585	1243
1033	C ₃ H ₁₀ O ₄	<i>d</i> (l)- β -Arabinose	150.08			1.605	1248
1034	C ₃ H ₁₀ O ₄	<i>dl</i> -Arabinose	150.08	164.5			
1035	C ₃ H ₁₀ O ₄	<i>d</i> -Lyxose	150.08	105		1.545	1228
1036	C ₃ H ₁₀ O ₄	<i>d</i> -Ribose	150.08	87			
1037	C ₃ H ₁₀ O ₄	<i>l</i> -Xylose	150.08	153		1.525	1231
1038	C ₃ H ₁₀ O ₄	<i>dl</i> -Xylose	150.08	131			
1039	C ₃ H ₁₀ O ₄	Arabonic acid HO ₂ C(CHOH) ₂ CH ₂ OH	166.08	89			
1040	C ₃ H ₁₁ Br	<i>n</i> -Amyl bromide CH ₃ (CH ₂) ₄ Br	151.00		127.9	1.223	401
1041	C ₃ H ₁₁ Br	Isoamyl bromide (CH ₃) ₂ CHCH ₂ CH ₂ Br	151.00		121	1.215	378
1042	C ₃ H ₁₁ Br	<i>tert</i> -Amyl bromide (CH ₃) ₂ C(CH ₃)CBr	151.00		109.2	1.190	380
1043	C ₃ H ₁₁ Cl	<i>n</i> -Amyl chloride CH ₃ (CH ₂) ₄ Cl	106.54		105.7	0.883	191
1044	C ₃ H ₁₁ Cl	Isoamyl chloride (CH ₃) ₂ CHCH ₂ CH ₂ Cl	106.54		99.1	0.893	181
1045	C ₃ H ₁₁ Cl	<i>tert</i> -Amyl chloride (CH ₃) ₂ C(CH ₃)CCl	106.54	-72.9	85.7	0.870 ¹⁸	155
1046	C ₃ H ₁₁ Cl	<i>sec</i> -Amyl chloride C ₃ H ₇ (CH ₂)CHCl	106.54		105	0.870	157
1047	C ₃ H ₁₁ Cl	3-Chloropentane (C ₂ H ₅) ₂ CHCl	106.54		105	0.895	
1048	C ₃ H ₁₁ ClO	<i>tert</i> -Amyl hypochlorite	122.54		76.3	0.855	
1049	C ₃ H ₁₁ F	<i>n</i> -Amyl fluoride CH ₃ (CH ₂) ₄ F	90.085	> -80	62.8	0.788	11
1050	C ₃ H ₁₁ F	Isoamyl fluoride (CH ₃) ₂ CHCH ₂ CH ₂ F	90.085	< -11	53.5		
1051	C ₃ H ₁₁ I	<i>n</i> -Amyl iodide CH ₃ (CH ₂) ₄ I	198.02		156	1.517	572
1052	C ₃ H ₁₁ I	Isoamyl iodide (CH ₃) ₂ CHCH ₂ CH ₂ I	198.02		118	1.510	
1053	C ₃ H ₁₁ I	<i>tert</i> -Amyl iodide (CH ₃) ₂ C(CH ₃)CI	198.02		125	1.497 ¹⁹	
1054	C ₃ H ₁₁ N	Piperidine	85.093	-9	105.8	0.800	444
1055	C ₃ H ₁₁ NO	Diethylketoxime (C ₂ H ₅) ₂ C=NOH	101.09		168.3	0.914	407
1056	C ₃ H ₁₁ NO	Methylpropylketoxime	101.09		168	0.909	403
1057	C ₃ H ₁₁ NO	Valeramide C ₄ H ₉ CONH ₂	101.09	106		1.023	
1058	C ₃ H ₁₁ NO	Isovaleramide (CH ₃) ₂ CHCH ₂ CONH ₂	101.09	137	232	0.905	
1059	C ₃ H ₁₁ NO ₂	1-Aminovaleric acid	117.09	291.5			
1060	C ₃ H ₁₁ NO ₂	3-Aminovaleric acid	117.09	193			
1061	C ₃ H ₁₁ NO ₂	4-Aminovaleric acid	117.09	157			
1062	C ₃ H ₁₁ NO ₂	2-Aminoisovaleric acid	117.09	217			
1063	C ₃ H ₁₁ NO ₂	<i>n</i> -Amyl nitrite CH ₃ (CH ₂) ₄ ONO	117.09		104 ⁸	0.853	56
1064	C ₃ H ₁₁ NO ₂	Isoamyl nitrite (CH ₃) ₂ CH(CH ₂) ₂ ONO	117.09		99	0.872	67
1065	C ₃ H ₁₁ NO ₂	<i>tert</i> -Amyl nitrite (CH ₃) ₂ C(CH ₃)CONO	117.09		93	0.903 ⁹	
1066	C ₃ H ₁₁ NO ₂	<i>n</i> -Butyl carbamate C ₄ H ₉ CO ₂ NH ₂	117.09	51			
1067	C ₃ H ₁₁ NO ₂	Isobutyl carbamate H ₂ NCO ₂ C ₃ H ₇	117.09	67	206		
1067.1	C ₃ H ₁₁ NO ₂	Ethylurethane C ₂ H ₅ NHCO ₂ C ₂ H ₅	117.09		176	0.981	262
1068	C ₃ H ₁₁ NO ₂	Betaine	117.09	273 d			
1069	C ₃ H ₁₁ NO ₂	<i>dl</i> -Valine (CH ₃) ₂ CHCH(NH ₂)CO ₂ H	117.09	298 d			
1069.1	C ₃ H ₁₁ NO ₂	<i>d</i> -Valine	117.09	315			1327
1070	C ₃ H ₁₁ NO ₃	Isoamyl nitrate	133.09		148	0.996 ^{21.7}	200
1070.1	C ₃ H ₁₁ NO ₃	Bios	133.09	223			1163
1070.2	C ₃ H ₁₁ NO ₄	Methyltetronic anide	149.09	135 d			1218
1071	C ₃ H ₁₁ NO ₅	<i>l</i> -Arabinose oxime	165.09	139			
1072	C ₃ H ₁₂	2-Methylbutane (Isopentane)	72.092	-159.7	28.0	0.621 ^{19.1}	9
1073	C ₃ H ₁₂	<i>n</i> -Pentane CH ₃ (CH ₂) ₃ CH ₃	72.092	-131.5	36.2	0.631	10
1074	C ₃ H ₁₂	2, 2-Dimethylpropane (C ₃ H ₈) ₂ C	72.092	-20	9.5		
1075	C ₃ H ₁₂ ClN	Piperidine hydrochloride	121.56	237			
1076	C ₃ H ₁₂ ClNO ₂	Betaine hydrochloride	153.56	235			
1077	C ₃ H ₁₂ N ₂ O	1, 2-Diethylurea CO(NHC ₂ H ₅) ₂	116.11	106	263	1.042	
1078	C ₃ H ₁₂ O	<i>n</i> -Amyl alcohol CH ₃ (CH ₂) ₄ CH ₂ OH	88.092	-78.5	137.9	0.817 ²⁰	823
1079	C ₃ H ₁₂ O	Isoamyl alcohol* (CH ₃) ₂ CHCH ₂ CH ₂ OH	88.092	-117.2	130.5	0.812	166
1080	C ₃ H ₁₂ O	Diethyl carbinol (C ₂ H ₅) ₂ CHOH	88.092		115.6	0.815 ²⁴	179
1081	C ₃ H ₁₂ O	<i>tert</i> -Amyl alcohol (CH ₃) ₂ C(CH ₃)COH	88.092	-11.9	101.8	0.809	158
1082	C ₃ H ₁₂ O	<i>tert</i> -Butyl carbinol	88.092	53	114		
1083	C ₃ H ₁₂ O	<i>d</i> -Amyl alcohol CH ₃ (C ₂ H ₅) ₂ CHCH ₂ OH	88.092		128	0.816	
1084	C ₃ H ₁₂ O	<i>sec</i> -Amyl alcohol CH ₃ (C ₂ H ₅) ₂ CH ₂ OH	88.092		119.5	0.809	165
1084.1	C ₃ H ₁₂ O	<i>d-sec</i> -Amyl alcohol	88.092		118	0.8103	154
85	C ₃ H ₁₃ O	Methyl isopropyl carbinol	88.092		114	0.819	
85.1	C ₃ H ₁₃ O	<i>d</i> -Methyl isopropyl carbinol	88.092			0.818	106
86	C ₃ H ₁₃ O	Ethyl propyl ether C ₂ H ₅ OC ₂ H ₅	88.092	< -79	61.4	0.732	24
87	C ₃ H ₁₃ O	Ethyl isopropyl ether C ₂ H ₅ OCH(CH ₃) ₂	88.092		54	0.745 ⁹	

* Commercially known as "Amyl alcohol."

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1088	C ₈ H ₁₈ O	Methyl <i>n</i> -butyl ether CH ₃ OC ₄ H ₉	88.092		70.3	0.764 ⁹	
1089	C ₅ H ₁₂ O ₂	Pentane-1, 2-diol C ₅ H ₁₂ (CHOHCH ₂ OH)	104.09		211.8	0.980 ₂₀ ¹⁰	376
1090	C ₅ H ₁₂ O ₂	Pentane-1, 5-diol CH ₂ (CH ₂ CH ₂ OH) ₂	104.09		239.4	0.994 ₂₀ ¹⁰	432
1091	C ₈ H ₁₈ O ₂	Methylene diethyl ether CH ₂ (OC ₂ H ₅) ₂	104.09		89	0.851 ⁹	
1092	C ₅ H ₁₂ O ₃	Glycerol 1-ethyl ether	120.09		230	1.091	
1093	C ₆ H ₁₄ O ₄	Pentaerythritol	136.09	253			1178
1094	C ₆ H ₁₄ O ₄	Adonitol	152.09	102			1333
1095	C ₆ H ₁₄ O ₄	<i>d</i> -Arabitol	152.09	103			
1096	C ₈ H ₁₈ S	<i>n</i> -Amyl mercaptan C ₅ H ₁₁ SH	104.16		126	0.857 ¹⁰	396
1097	C ₈ H ₁₈ S	<i>act</i> -Amyl mercaptan	104.16		118	0.848 ¹¹	
1098	C ₈ H ₁₈ S	Isoamyl mercaptan	104.16		129.5	0.835	379
1099	C ₈ H ₁₇ N	<i>n</i> -Amylamine C ₅ H ₁₁ NH ₂	87.108	-55.0	104	0.766 ¹⁰	
1100	C ₈ H ₁₇ N	Isoamylamine (CH ₃) ₂ CHCH ₂ CH ₂ NH ₂	87.108		95	0.751	176
1101	C ₈ H ₁₇ N	<i>sec</i> -Amylamine CH ₃ (C ₃ H ₇)CH ₂ NH ₂	87.108		91	0.749	
1102	C ₈ H ₁₇ N	<i>tert</i> -Amylamine (CH ₃) ₂ (C ₃ H ₇)CNH ₂	87.108	-105.0	78		
1103	C ₈ H ₁₅ NO ₂	Ammonium valerate	119.11				1333
1105	C ₈ H ₁₅ N ₃	Pentamethylenediamine	102.12	9	178	0.885 ₁₅ ¹¹	482
1106	C ₆ Br ₂ O ₂	Bromanil OC ₂ (CBr(CBr) ₂)CO	423.66	300			
1107	C ₆ Br ₆	Hexabromobenzene	551.50	306			
1108	C ₆ Br ₆ O	"Hexabromophenol"	367.50	128			
1109	C ₆ Cl ₄ O ₂	Chloranil OC ₂ (CCl(CCl) ₂)CO	245.83	290			
1110	C ₆ Cl ₆	Hexachlorobenzene	284.75	226	326	1.569 ₂₀ ¹⁰	
1111	C ₆ Cl ₆ O	"Hexachlorophenol"	300.75	46			
1111.1	C ₆ Cl ₈ O	β -Octachlorocyclohexenone	371.67	90		2.016	1292
1111.2	C ₆ Cl ₈ O	γ -Octachlorocyclohexenone	371.67	89		2.058	1305
1112	C ₆ I ₆	Hexaiodobenzene	833.59	350 d.			
1113	C ₆ IBr ₄	Pentabromobenzene	472.59	293			
1114	C ₆ IBr ₄ O	Pentabromophenol C(Br) ₅ OH	488.59	225			
1115	C ₆ HCl ₃ O ₂	Trichloroquinone	211.38	168			
1116	C ₆ HCl ₄ NO ₂	2, 3, 4, 5-Tetrachloronitrobenzene	260.85	64.5			
1117	C ₆ HCl ₄ NO ₂	2, 3, 4, 6-Tetrachloronitrobenzene	260.85	22			
1118	C ₆ HCl ₄ NO ₂	2, 3, 5, 6-Tetrachloronitrobenzene	260.85	99	304 d.		
1119	C ₆ HCl ₅	Pentachlorobenzene	250.30	86	277	1.842 ¹⁰	
1120	C ₆ HCl ₅ O	Pentachlorophenol HOC ₅ Cl ₅	266.30	188	310.2	1.978	
1121	C ₆ H ₃ N ₃ O ₃	Pentanitrophenol C ₆ (NO ₂) ₅ OH	319.05	190 d.			
1122	C ₆ H ₂ Br ₂ N ₂ O ₄	Picryl bromide 2, 4, 6(NO ₂) ₃ C ₆ H ₂ Br	291.96	123			
1122.1	C ₆ H ₂ Br ₂ N ₂ O ₄	1, 2-Dinitro-4, 5-dibromobenzene	325.86	115		2.313	
1122.2	C ₆ H ₂ Br ₂ N ₂ O ₄	1, 3-Dinitro-4, 6-dibromobenzene	325.86	117		2.295	
1123	C ₆ H ₂ Br ₄	1, 2, 3, 5-Tetrabromobenzene	393.68	98.5	329		
1124	C ₆ H ₂ Br ₄	1, 2, 4, 5-Tetrabromobenzene	393.68	178		3.027	
1125	C ₆ H ₂ Br ₄ O	2, 3, 4, 6-Tetrabromophenol	409.68	120			
1126	C ₆ H ₂ Br ₃ N	Pentabromoaniline C ₆ (Br) ₅ NH ₂	487.60	222			
1127	C ₆ H ₂ Cl ₃ N ₃ O ₄	Picryl chloride (NO ₂) ₃ C ₆ H ₂ Cl	247.50	83		1.797	
1128	C ₆ H ₂ Cl ₃ N ₃ O ₄	5-Chloro-1, 2, 4-trinitrobenzene	247.50	116			
1129	C ₆ H ₂ Cl ₂ O ₂	2, 5-Dichloroquinone	176.93	161			
1130	C ₆ H ₂ Cl ₂ O ₂	2, 6-Dichloroquinone	176.93	121			
1131	C ₆ H ₂ Cl ₃ NO ₂	2, 3, 4-Trichloronitrobenzene	226.40	56			
1132	C ₆ H ₂ Cl ₃ NO ₂	2, 3, 6-Trichloronitrobenzene	226.40	89			
1133	C ₆ H ₂ Cl ₃ NO ₂	2, 4, 5-Trichloronitrobenzene	226.40	57	288	1.790	
1134	C ₆ H ₂ Cl ₃ NO ₂	2, 4, 6-Trichloronitrobenzene	226.40	68			
1135	C ₆ H ₂ Cl ₄	1, 2, 3, 4-Tetrachlorobenzene	215.85	47.5	254		
1136	C ₆ H ₂ Cl ₄	1, 2, 3, 5-Tetrachlorobenzene	215.85	51			
1137	C ₆ H ₂ Cl ₄	1, 2, 4, 5-Tetrachlorobenzene	215.85	138	246	1.734 ¹⁰	
1138	C ₆ H ₂ Cl ₄ O	2, 3, 4, 6-Tetrachlorophenol	231.85	69	164 ¹¹		
1139	C ₆ H ₂ Cl ₄ O ₂	Tetrachlorohydroquinone	247.85	232			
1140	C ₆ H ₂ Cl ₃ N	Pentachloroaniline C ₆ (Cl) ₅ NH ₂	265.31	232			
1141	C ₆ H ₂ I ₂ N ₂ O ₄	Picryl iodide (NO ₂) ₃ C ₆ H ₂ I	338.97	165		2.285 ₂₀ ¹¹	
1142	C ₆ H ₂ I ₂ N ₂ O ₄	2, 4-Diiodo-1, 3-dinitrobenzene	419.90	162			1315
1143	C ₆ H ₂ I ₂ N ₂ O ₄	4, 6-Diiodo-1, 3-dinitrobenzene	419.90	168.4		2.744	
1144	C ₆ H ₂ I ₄	1, 2, 3, 4-Tetraiodobenzene	581.74	136			
1145	C ₆ H ₂ I ₄	1, 2, 3, 5-Tetraiodobenzene	581.74	148			
1146	C ₆ H ₂ I ₄	1, 2, 4, 5-Tetraiodobenzene	581.74	254			
1147	C ₆ H ₂ N ₄ O ₆	2, 3, 4, 6-Tetranitrophenol	274.05	140	d.		

C-TABLE: C₆H₄ TO C₆H₆

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No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1148	C ₆ H ₂ O ₄	Diacetylenedicarboxylic acid	138.02	178 exp.			
1149	C ₆ H ₂ BrN ₂ O ₄	3-Bromo-1, 2-dinitrobenzene	246.96	101.5	320		1302
1150	C ₆ H ₂ BrN ₂ O ₄	4-Bromo-1, 2-dinitrobenzene	246.96	59.4			
1151	C ₆ H ₂ BrN ₂ O ₄	4-Bromo-1, 3-dinitrobenzene	246.96	75.3			
1152	C ₆ H ₂ Br ₂ NO ₂	2, 4-Dibromonitrobenzene	280.86	62		2.350	
1153	C ₆ H ₂ Br ₂ NO ₂	2, 5-Dibromonitrobenzene	280.86	85		2.368	
1154	C ₆ H ₂ Br ₂ NO ₂	3, 4-Dibromonitrobenzene	280.86	58	296	2.354	
1155	C ₆ H ₂ Br ₂ NO ₂	3, 5-Dibromonitrobenzene	280.86	106			
1155.1	C ₆ H ₂ Br ₂ NO ₂	4, 6-Dibromo-2-nitrophenol	296.86	117.5		2.434	
1156	C ₆ H ₂ Br ₃	1, 2, 3-Tribromobenzene	314.77	87.4		2.058	
1157	C ₆ H ₂ Br ₃	1, 2, 4-Tribromobenzene	314.77	44	276		
1158	C ₆ H ₂ Br ₃	1, 3, 5-Tribromobenzene	314.77	119.6	278		
1159	C ₆ H ₂ Br ₃ O	2, 3, 5-Tribromophenol Br ₃ C ₆ H ₂ OH	330.77	92.5			
1160	C ₆ H ₂ Br ₃ O	2, 4, 6-Tribromophenol Br ₃ C ₆ H ₂ OH	330.77	96		2.55	
1161	C ₆ H ₂ Br ₃ O ₂	2, 4, 6-Tribromoresorcinol	346.77	111			
1162	C ₆ H ₂ ClN ₂ O ₄	3-Chloro-1, 2-dinitrobenzene	202.50	86.8			
1163	C ₆ H ₂ ClN ₂ O ₄	4-Chloro-1, 2-dinitrobenzene	202.50	α 36.3 β 37.1 γ 38.8 δ 28	315 d		
1164	C ₆ H ₂ ClN ₂ O ₄	2-Chloro-1, 3-dinitrobenzene	202.50	87			
1165	C ₆ H ₂ ClN ₂ O ₄	α-4-Chloro-1, 3-dinitrobenzene	202.50	53.4	315	1.697	
1166	C ₆ H ₂ ClN ₂ O ₄	β-4-Chloro-1, 3-dinitrobenzene	202.50	43	315	1.680	
1167	C ₆ H ₂ ClN ₂ O ₄	5-Chloro-1, 3-dinitrobenzene	202.50	50			
1168	C ₆ H ₂ ClN ₂ O ₄	2-Chloro-1, 4-dinitrobenzene	202.50	60			
1169	C ₆ H ₂ Cl ₂ NO ₂	2, 3-Dichloronitrobenzene	191.95	62	258	1.721 ¹⁴	
1170	C ₆ H ₂ Cl ₂ NO ₂	2, 4-Dichloronitrobenzene	191.95	33		1.430 ¹⁰	
1171	C ₆ H ₂ Cl ₂ NO ₂	2, 5-Dichloronitrobenzene	191.95	54.5	266	1.669 ¹³	
1172	C ₆ H ₂ Cl ₂ NO ₂	2, 6-Dichloronitrobenzene	191.95	72.5	130 ⁸	1.603 ¹⁷	
1173	C ₆ H ₂ Cl ₂ NO ₂	3, 4-Dichloronitrobenzene	191.95	43	256	1.451 ¹⁰	
1174	C ₆ H ₂ Cl ₂ NO ₂	3, 5-Dichloronitrobenzene	191.95	65.4		1.692 ¹⁴	
1174.1	C ₆ H ₂ Cl ₂ NO ₂	4, 6-Dichloro-2-nitrophenol	207.95	122		1.822	
1175	C ₆ H ₂ Cl ₃	1, 2, 3-Trichlorobenzene	181.40	52	219		
1176	C ₆ H ₂ Cl ₃	1, 2, 4-Trichlorobenzene	181.40	17	213	1.574 ¹⁰	754
1177	C ₆ H ₂ Cl ₃	1, 3, 5-Trichlorobenzene	181.40	63	208.5		
1178	C ₆ H ₂ Cl ₃ O	2, 3, 5-Trichlorophenol	197.40	53.4	253		
1179	C ₆ H ₂ Cl ₃ O	2, 4, 6-Trichlorophenol	197.40	68	244.5		
1180	C ₆ H ₂ Cl ₃ O ₂	2, 3, 5-Trichlorohydroquinone	213.40	134			
1181	C ₆ H ₂ Cl ₃ O ₂	2, 4, 6-Trichlororesorcinol	213.40	83			
1182	C ₆ H ₂ Cl ₃ O ₂ S ₂	Benzene-1, 3, 5-trisulfonyl chloride	373.59	184			
1183	C ₆ H ₂ Cl ₄ N	2, 3, 4, 5-Tetrachloroaniline	230.86	118			
1184	C ₆ H ₂ Cl ₄ N	2, 3, 4, 6-Tetrachloroaniline	230.86	88			
1185	C ₆ H ₂ Cl ₄ N	2, 3, 5, 6-Tetrachloroaniline	230.86	90			
1186	C ₆ H ₂ I ₃	1, 2, 3-Triiodobenzene	455.82	116			
1187	C ₆ H ₂ I ₃	1, 2, 4-Triiodobenzene	455.82	84			
1188	C ₆ H ₂ I ₃	1, 3, 5-Triiodobenzene	455.82	181			
1189	C ₆ H ₂ I ₃ O	2, 4, 6-Triiodophenol I ₃ C ₆ H ₂ (OH)	471.82	156			
1190	C ₆ H ₂ N ₃ O ₆	1, 2, 3-Trinitrobenzene	213.05	127.5			
1191	C ₆ H ₂ N ₃ O ₆	1, 2, 4-Trinitrobenzene	213.05	61		1.73 ^{13, 5}	
1192	C ₆ H ₂ N ₃ O ₆	1, 3, 5-Trinitrobenzene	213.05	121; 61	d.	1.688	
1193	C ₆ H ₂ N ₃ O ₆ S	Thiopicric acid	245.11	114	exp. 115		
1194	C ₆ H ₂ N ₃ O ₇	2, 3, 5-Trinitrophenol C ₆ H ₂ (NO ₂) ₃ OH	229.05	120			
1195	C ₆ H ₂ N ₃ O ₇	2, 3, 6-Trinitrophenol C ₆ H ₂ (NO ₂) ₃ OH	229.05	118			
1196	C ₆ H ₂ N ₃ O ₇	2, 4, 5-Trinitrophenol C ₆ H ₂ (NO ₂) ₃ OH	229.05	96			
1197	C ₆ H ₂ N ₃ O ₇	Pieric acid (NO ₂) ₃ C ₆ H ₂ OH	229.05	121.8	exp. > 300	1.763	1313
1198	C ₆ H ₂ N ₃ O ₈	Styphnic acid	245.05	180		1.829	
1199	C ₆ H ₂ N ₃ O ₈ S	Picrylsulfonic acid	293.11	100			
1200	C ₆ H ₂ N ₄ O ₈	2, 3, 4, 6-Tetranitroaniline	273.06	170	exp 237	1.89	1314
1200.1	C ₆ H ₂ BrCl	o-Bromochlorobenzene	191.40	-12.6	204 ¹⁶⁶	1.656 ^{12, 5}	765
1200.2	C ₆ H ₂ BrCl	m-Bromochlorobenzene	191.40	-21.2	196	1.627 ¹⁴	764
1200.3	C ₆ H ₂ BrCl	p-Bromochlorobenzene	191.40	67.4	196.3		
1200.4	C ₆ H ₂ BrI	o-Bromoiodobenzene	282.88	2.1	257.4 ¹⁴⁴		
1200.5	C ₆ H ₂ BrI	m-Bromoiodobenzene	282.88	-9.3	252 ¹⁴⁴		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1200 6	C ₆ H ₄ BrI	<i>p</i> -Bromiodobenzene	282.88	92	251.6 ⁷⁴		
1201	C ₆ H ₄ BrNO ₂	<i>o</i> -Bromonitrobenzene	201.96	43.0	261	1.023 ⁸⁰	
1202	C ₆ H ₄ BrNO ₂	<i>m</i> -Bromonitrobenzene	201.96	56.0	256.5	1.704	777
1203	C ₆ H ₄ BrNO ₂	<i>p</i> -Bromonitrobenzene	201.96	127	256		
1204	C ₆ H ₄ Br ₂	<i>o</i> -Dibromobenzene	235.86	1.8	221	1.966 ¹⁵	787
1205	C ₆ H ₄ Br ₂	<i>m</i> -Dibromobenzene	235.86	-6.9	217	1.955	783
1206	C ₆ H ₄ Br ₂	<i>p</i> -Dibromobenzene	235.86	86.8	219	1.954	1132
1207	C ₆ H ₃ Br ₂ O	2, 4-Dibromophenol	251.86	36	239		
1208	C ₆ H ₃ Br ₂ O	2, 6-Dibromophenol	251.86	56			
1209	C ₆ H ₃ Br ₂ O	3, 4-Dibromophenol	251.86	80			
1210	C ₆ H ₃ Br ₂ O	3, 5-Dibromophenol	251.83	76.5			
1211	C ₆ H ₃ Br ₂ O ₂	2, 4-Dibromoresorcinol	267.86	92.5			
1212	C ₆ H ₃ Br ₂ O ₂	4, 6-Dibromoresorcinol	267.86	112	130 (in CO ₂)		
1213	C ₆ H ₃ Br ₂ N	2, 4, 6-Tribromoaniline	329.79	119	300		
1214	C ₆ H ₃ Br ₂ N	3, 4, 5-Tribromoaniline	329.79	118			
1214 1	C ₆ H ₄ Cl	<i>p</i> -Chloriodobenzene	238.42	57	227.6 ⁷⁴		
1215	C ₆ H ₄ ClNO ₂	<i>o</i> -Chloronitrobenzene	157.50	32.5	245.7	1.365	
1216	C ₆ H ₄ ClNO ₂	<i>m</i> -Chloronitrobenzene	157.50	44.4; 23.7	235.6	1.534	
1217	C ₆ H ₄ ClNO ₂	<i>p</i> -Chloronitrobenzene	157.50	83.5	242	1.520	
1218	C ₆ H ₃ ClNO ₂	1-Chloro-2-nitrophenol	173.50	87			
1219	C ₆ H ₃ ClNO ₂	5-Chloro-2-nitrophenol	173.50	38.9			
1220	C ₆ H ₃ ClNO ₂	6-Chloro-2-nitrophenol	173.50	70			
1221	C ₆ H ₃ ClNO ₂	2-Chloro-3-nitrophenol	173.50	120			
1222	C ₆ H ₃ ClNO ₂	1-Chloro-3-nitrophenol	173.50	127			
1223	C ₆ H ₃ ClNO ₂	5-Chloro-3-nitrophenol	173.50	147			
1224	C ₆ H ₃ ClNO ₂	6-Chloro-3-nitrophenol	173.50	118			
1225	C ₆ H ₃ ClNO ₂	2-Chloro-4-nitrophenol	173.50	111			
1226	C ₆ H ₃ ClNO ₂	3-Chloro-4-nitrophenol	173.50	133			
1227	C ₆ H ₃ ClNO ₂ S	2-Chloronitrobenzene-5-sulfonic acid	237.56	>200 d.			
1228	C ₆ H ₃ ClNO ₂ S	5-Chloronitrobenzene-3-sulfonic acid	237.56	200 d.			
1229	C ₆ H ₄ Cl ₂	<i>o</i> -Dichlorobenzene	146.95	-17.6	179	1.298	731
1230	C ₆ H ₄ Cl ₂	<i>m</i> -Dichlorobenzene	146.95	-24.8	173	1.288	723
1231	C ₆ H ₄ Cl ₂	<i>p</i> -Dichlorobenzene	146.95	52.9	173	1.458	1101
1232	C ₆ H ₃ Cl ₂ O	2, 3-Dichlorophenol	162.95	57			
1233	C ₆ H ₃ Cl ₂ O	2, 4-Dichlorophenol	162.95	45	210		
1234	C ₆ H ₃ Cl ₂ O	2, 5-Dichlorophenol	162.95	58	211.7		
1235	C ₆ H ₃ Cl ₂ O	2, 6-Dichlorophenol	162.95	67	220		
1236	C ₆ H ₃ Cl ₂ O	3, 4-Dichlorophenol	162.95	68	253.5		
1237	C ₆ H ₃ Cl ₂ O	3, 5-Dichlorophenol	162.95	68	233.1		
1238	C ₆ H ₃ Cl ₂ O ₂	2, 3-Dichlorohydroquinone	178.95	145			
1239	C ₆ H ₃ Cl ₂ O ₂	2, 5-Dichlorohydroquinone	178.95	170		1.824	
1240	C ₆ H ₃ Cl ₂ O ₂	2, 6-Dichlorohydroquinone	178.95	164			
1241	C ₆ H ₃ Cl ₂ O ₂ S	2, 5-Dichlorobenzenesulfonic acid	227.01	97			
1242	C ₆ H ₄ Cl ₂ O ₂ S ₂	<i>o</i> -Benzenedisulfonyl chloride	275.08	105			
1243	C ₆ H ₄ Cl ₂ O ₂ S ₂	<i>m</i> -Benzenedisulfonyl chloride	275.08	63			
1244	C ₆ H ₄ Cl ₂ O ₂ S ₂	<i>p</i> -Benzenedisulfonyl chloride	275.08	131			
1245	C ₆ H ₃ Cl ₃ N	2, 3, 4-Trichloroaniline	196.41	67.5	291.5		
1246	C ₆ H ₃ Cl ₃ N	2, 4, 5-Trichloroaniline	196.41	96	270		
1247	C ₆ H ₃ Cl ₃ N	2, 4, 6-Trichloroaniline	196.41	77.5	262.4		
1248	C ₆ H ₃ Cl ₃ N	3, 4, 5-Trichloroaniline	196.41	100			
1249	C ₆ H ₃ FNO ₂	<i>o</i> -Fluoronitrobenzene	141.04	-5.9	214.6	1.338	700
1250	C ₆ H ₃ FNO ₂	<i>m</i> -Fluoronitrobenzene	141.04	1.7	205	1.327	688
1251	C ₆ H ₃ FNO ₂	<i>p</i> -Fluoronitrobenzene	141.04	26.5;	205	1.326	1084
				21.5			
1252	C ₆ H ₄ F ₂	<i>m</i> -Difluorobenzene	114.03		83	1.172	384
1253	C ₆ H ₄ F ₂	<i>p</i> -Difluorobenzene	114.03	-23.7	88.9	1.164	362
1254	C ₆ H ₄ I ₂ NO ₂	<i>o</i> -Iodonitrobenzene	248.97	49.4	290	1.810 ^{15, 16}	
1255	C ₆ H ₄ I ₂ NO ₂	<i>m</i> -Iodonitrobenzene	248.97	36	280	1.804 ^{15, 16}	
1256	C ₆ H ₄ I ₂ NO ₂	<i>p</i> -Iodonitrobenzene	248.97	171.5	288.1	1.809 ^{15, 16}	
1257	C ₆ H ₃ I ₂ NO ₂	4-Iodo-6-nitrophenol	264.97	81			
1258	C ₆ H ₄ I ₂	<i>o</i> -Diiodobenzene	329.90	23.4	286.8		
1259	C ₆ H ₄ I ₂	<i>m</i> -Diiodobenzene	329.90	34.2	284.8		
1260	C ₆ H ₄ I ₂	<i>p</i> -Diiodobenzene	329.90	129.4	285		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1261	C ₆ H ₄ I ₂ O	2, 4-Diiodophenol	345.90	72	100		
1262	C ₆ H ₄ I ₂ O	2, 6-Diiodophenol I ₂ C ₆ H ₃ OH	345.90	68			
1263	C ₆ H ₄ I ₂ O	3, 4-Diiodophenol I ₂ C ₆ H ₃ OH	345.90	83			
1264	C ₆ H ₄ I ₂ O	3, 5-Diiodophenol I ₂ C ₆ H ₃ OH	345.90	104			
1265	C ₆ H ₄ I ₂ O ₈	2, 6-Diiodophenol-4-sulfonic acid	425.96	120	190 d.		
1266	C ₆ H ₄ I ₂ N	2, 4, 6-Triiodoaniline I ₃ C ₆ H ₂ NH ₂	470.84	185.5			
1267	C ₆ H ₄ N ₂	Pyridyl-2-cyanide CN.C ₅ H ₄ N	104.05	29			
1268	C ₆ H ₄ N ₂	Pyridyl-3-cyanide CN.C ₅ H ₄ N	104.05	50			
1269	C ₆ H ₄ N ₂	Pyridyl-4-cyanide CN.C ₅ H ₄ N	104.05	79			
1270	C ₆ H ₄ N ₂ O	<i>p</i> -Diazophenol	120.05	exp. 38			
1271	C ₆ H ₄ N ₂ O ₄	<i>o</i> -Dinitrobenzene	168.05	116.5	319	1.59	
1272	C ₆ H ₄ N ₂ O ₄	<i>m</i> -Dinitrobenzene	168.05	89.7	302	1.575	
1273	C ₆ H ₄ N ₂ O ₄	<i>p</i> -Dinitrobenzene	168.05	172.1	299	1.625	
1274	C ₆ H ₄ N ₂ O ₆	2, 3-Dinitrophenol (NO ₂) ₂ C ₆ H ₃ OH	184.05	144			
1275	C ₆ H ₄ N ₂ O ₆	2, 4-Dinitrophenol	184.05	111.6		1.683	
1276	C ₆ H ₄ N ₂ O ₆	2, 5-Dinitrophenol (NO ₂) ₂ C ₆ H ₃ OH	184.05	104			
1277	C ₆ H ₄ N ₂ O ₆	2, 6-Dinitrophenol (NO ₂) ₂ C ₆ H ₃ OH	184.05	61.8			
1278	C ₆ H ₄ N ₂ O ₆	3, 4-Dinitrophenol (NO ₂) ₂ C ₆ H ₃ OH	184.05	134			
1279	C ₆ H ₄ N ₂ O ₆	3, 5-Dinitrophenol	184.05	126.1			
1280	C ₆ H ₄ N ₂ O ₆	2, 4-Dinitrosoreinol	200.05	148	d.		
1281	C ₆ H ₄ N ₂ O ₆	4, 6-Dinitrosoreinol	200.05	215			
1282	C ₆ H ₄ N ₂ O ₈ S	2, 4-Dinitrobenzenesulfonic acid	248.11	108			
1283	C ₆ H ₄ N ₂ S	Benzisothiadiazole	136.11	44	206		
1284	C ₆ H ₄ N ₂ O ₆	Pieramide 2, 4, 6-(NO ₂) ₃ C ₆ H ₂ NH ₂	228.06	188			
1285	C ₆ H ₄ N ₂ O ₇	2, 4, 6-Trinitroaminophenol	244.06	178			
1286	C ₆ H ₄ N ₄	Hexaazobenzene	160.08	83			
1287	C ₆ H ₄ O ₂	Quinone	108.03	115.7		1.318	
1288	C ₆ H ₄ O ₄	2, 5-Dihydroxyquinone	140.03	220			
1289	C ₆ H ₄ O ₆	Sarsapic acid.	172.03	305			
1290	C ₆ H ₄ O ₈	Ethanetetracarboxylic acid	204.03	169 d.			
1291	C ₆ H ₅ AsCl ₂	Phenyl dichloroarsine	222.92		253		
1292	C ₆ H ₅ AsO	Phenylarsine oxide	168.00	120			
1294	C ₆ H ₅ Br	Bromobenzene	156.96	-30.6	156.2	1.497	747
1295	C ₆ H ₅ BrN ₂ O ₂	4-Bromo-2-nitroaniline	216.97	111			
1296	C ₆ H ₅ BrO	<i>o</i> -Bromophenol	172.96	5.6	195	1.553 ⁸⁰	
1297	C ₆ H ₅ BrO	<i>m</i> -Bromophenol	172.96	33	236.5		
1298	C ₆ H ₅ BrO	<i>p</i> -Bromophenol	172.96	68.5	238	1.588 ⁹⁰	
1299	C ₆ H ₅ BrO ₂	Bromohydroquinone	188.96	115			
1300	C ₆ H ₅ BrO ₂	2(4)-Bromoresorcinol	188.96	91			
1301	C ₆ H ₅ BrO ₃ S	<i>p</i> -Bromobenzenesulfonic acid	237.02	88			
1302	C ₆ H ₅ Br ₂ N	2, 4-Dibromoaniline	250.88	79.5			
1303	C ₆ H ₅ Br ₂ N	2, 5-Dibromoaniline	250.88	52			
1304	C ₆ H ₅ Br ₂ N	2, 6-Dibromoaniline	250.88	84	264		
1305	C ₆ H ₅ Br ₂ N	3, 4-Dibromoaniline	250.88	80.4			
1306	C ₆ H ₅ Br ₂ N	3, 5-Dibromoaniline	250.88	56.5			
1307	C ₆ H ₅ Cl	Chlorobenzene	112.50	-45.2	132.1	1.107	681
1308	C ₆ H ₅ ClN ₂ O ₂	2-Chloro-4-nitroaniline	172.51	105			
1309	C ₆ H ₅ ClN ₂ O ₂	2-Chloro-5-nitroaniline	172.51	118			
1310	C ₆ H ₅ ClN ₂ O ₂	3-Chloro-4-nitroaniline	172.51	157			
1311	C ₆ H ₅ ClN ₂ O ₂	3-Chloro-6-nitroaniline	172.51	125			
1312	C ₆ H ₅ ClN ₂ O ₂	4-Chloro-2-nitroaniline	172.51	115			
1313	C ₆ H ₅ ClN ₂ O ₂	4-Chloro-3-nitroaniline	172.51	103			
1314	C ₆ H ₅ ClO	<i>o</i> -Chlorophenol	128.50	α 7; β 0; γ -4.1	173	1.241 ^{11, 12}	1058
1315	C ₆ H ₅ ClO	<i>m</i> -Chlorophenol	128.50	32.8	214		1059
1316	C ₆ H ₅ ClO	<i>p</i> -Chlorophenol	128.50	37	217	1.306	1060
1317	C ₆ H ₅ ClO ₂	Chlorohydroquinone	144.50	106	263		
1318	C ₆ H ₅ ClO ₂ S	Benzenesulfone chloride	176.56	14.5	247	1.383 ¹³	
1319	C ₆ H ₅ ClO ₃ S	<i>p</i> -Chlorobenzenesulfonic acid	192.56	67	146 ²⁵		
1320	C ₆ H ₄ Cl ₂ N	2, 3-Dichloroaniline	161.96	24	252		
1321	C ₆ H ₄ Cl ₂ N	2, 4-Dichloroaniline	161.96	63	245	1.567	
1322	C ₆ H ₄ Cl ₂ N	2, 5-Dichloroaniline	161.96	50	251		
1323	C ₆ H ₄ Cl ₂ N	2, 6-Dichloroaniline Cl ₂ C ₆ H ₂ NH ₂	161.96	39			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1324	C ₆ H ₄ Cl ₂ N	3, 4-Dichloroaniline	161.96	71.5	272		
1325	C ₆ H ₄ Cl ₂ N	3, 5-Dichloroaniline	161.96	50.5	260		
1326	C ₆ H ₄ Cl ₂ OP	Phosphoryl oxychloride	194.98		258	1.375	
1327	C ₆ H ₄ Cl ₂ P	Phosphoryl chloride	178.98		224.6	1.319	804
1328	C ₆ H ₅ F	Fluorobenzene	96.039	-41.2	86	1.024	487
1329	C ₆ H ₄ FO	<i>o</i> -Fluorophenol FC ₆ H ₄ OH	112.04	16.1			
1330	C ₆ H ₄ FO	<i>m</i> -Fluorophenol	112.04	13.8	183 ⁴⁹	1.222	652
1331	C ₆ H ₄ FO	<i>p</i> -Fluorophenol	112.04	28.5; 48.2	188	1.189 ⁴⁸	1083
1332	C ₆ H ₄ F ₂ N	2, 5-Difluoroaniline	129.05	13.5	85.8 ³⁰	1.288 ^{17, 2}	
1333	C ₆ H ₅ I	Iodobenzene	203.97	-31.4	188.6	1.832	792
1334	C ₆ H ₄ IO	<i>o</i> -Iodophenol	219.97	40.4	187 ¹⁰⁰	1.876 ⁸⁰	
1335	C ₆ H ₄ IO	<i>m</i> -Iodophenol IC ₆ H ₄ OH	219.97	40			
1336	C ₆ H ₄ IO	<i>p</i> -Iodophenol IC ₆ H ₄ OH	219.97	94			
1337	C ₆ H ₄ IO	Iodosobenzene	219.97	exp. 210			
1338	C ₆ H ₄ IO ₂	Iodoxybenzene	235.97	exp. 238			
1339	C ₆ H ₄ IO ₂ S	Benzenesulfone iodide C ₆ H ₄ SO ₂ I	268.04	45			
1340	C ₆ H ₄ I ₂ N	2, 4-Diodoaniline I ₂ C ₆ H ₄ NH ₂	344.91	96			
1341	C ₆ H ₅ NO	Pyridyl- α -aldehyde	107.05		181	1.126	947
1342	C ₆ H ₅ NO	Pyridyl- β -aldehyde	107.05		97 ¹⁵		
1343	C ₆ H ₅ NO	Nitrosobenzene	107.05	68	59 ¹⁸		
1344	C ₆ H ₅ NO ₂	Picoline acid	123.05	137			
1345	C ₆ H ₅ NO ₂	Nicotinic acid	123.05	232			
1346	C ₆ H ₅ NO ₂	Isonicotinic acid	123.05	317			
1347	C ₆ H ₅ NO ₂	Nitrobenzene	123.05	5.7	210.9	1.207	736
1348	C ₆ H ₄ NO ₂	<i>p</i> -Nitrosophenol ONC ₆ H ₄ OH	123.05	126			
1349	C ₆ H ₅ NO ₂	<i>o</i> -Nitrophenol	139.05	45	214.5	1.447	
1350	C ₆ H ₅ NO ₂	<i>m</i> -Nitrophenol	139.05	96	194 ⁷⁰	1.485	
1351	C ₆ H ₅ NO ₂	<i>p</i> -Nitrophenol	139.05	113		1.468	
1352	C ₆ H ₄ NO ₂	2-Nitrosoreinol <i>m</i> -(OH) ₂ C ₆ H ₃ NO ₂	155.05	85			
1353	C ₆ H ₄ NO ₂	4-Nitrosoreinol <i>m</i> -(OH) ₂ C ₆ H ₃ NO ₂	155.05	115			
1354	C ₆ H ₅ NO ₂	Nitrohydroquinone	155.05	134			
1355	C ₆ H ₄ NO ₂ S	2-Nitrophenol-4-sulfonic acid	219.11	141			
1356	C ₆ H ₅ N ₂	Azaminobenzene	119.06	99			
1357	C ₆ H ₅ N ₂	Triazobenzene	119.06		73.5 ²⁴	1.098 ¹⁰	991
1358	C ₆ H ₄ N ₂ O ₄	2, 3-Dinitroaniline (NO ₂) ₂ C ₆ H ₃ NH ₂	183.06	127			
1359	C ₆ H ₄ N ₂ O ₄	2, 4-Dinitroaniline	183.06	188			
1360	C ₆ H ₄ N ₂ O ₄	2, 5-Dinitroaniline (NO ₂) ₂ C ₆ H ₃ NH ₂	183.06	137			
1361	C ₆ H ₄ N ₂ O ₄	2, 6-Dinitroaniline	183.06	138			
1362	C ₆ H ₄ N ₂ O ₄	3, 4-Dinitroaniline (NO ₂) ₂ C ₆ H ₃ NH ₂	183.06	154			
1363	C ₆ H ₄ N ₂ O ₄	3, 5-Dinitroaniline (NO ₂) ₂ C ₆ H ₃ NH ₂	183.06	159			
1364	C ₆ H ₅ N ₂ O ₃	Picramic acid	199.06	165			1320
1365	C ₆ H ₆	Benzene	78.046	5.5	79.6	0.878	606
1366	C ₆ H ₆	Dipropargyl	78.046	-6	85.4	0.805	380
1367	C ₆ H ₄ AsCl ₃	Tri-(2-chlorovinyl)arsine	259.38		260	1.572	
1368	C ₆ H ₄ BrN	<i>o</i> -Bromoaniline	171.97	31.5	251		
1369	C ₆ H ₄ BrN	<i>m</i> -Bromoaniline	171.97	18.5	251	1.587 ^{14, 2}	793
1370	C ₆ H ₄ BrN	<i>p</i> -Bromoaniline BrC ₆ H ₄ NH ₂	171.97	66.4			
1371	C ₆ H ₃ Br ₂ N ₂	3, 4-Dibromophenylhydrazine	265.89	75			
1372	C ₆ H ₃ Br ₂ N ₂	3, 5-Dibromophenylhydrazine	265.89	95.5			
1373	C ₆ H ₂ Br ₄	α -trans-Benzenhexabromide	557.54	212			
1374	C ₆ H ₂ Br ₄	β -cis-Benzenhexabromide	557.54	253			
1375	C ₆ H ₄ ClN	<i>o</i> -Chloroaniline ClC ₆ H ₄ NH ₂	127.51	0	210.5	1.213	774
1376	C ₆ H ₄ ClN	<i>m</i> -Chloroaniline	127.51	-10.4	229.8	1.215	776
1377	C ₆ H ₄ ClN	<i>p</i> -Chloroaniline	127.51	71	231	1.170 ⁷⁹	
1378	C ₆ H ₃ ClNO	2-Chloro-3-aminophenol	143.51	87			
1379	C ₆ H ₃ ClNO	2-Chloro-4-aminophenol	143.51	153			
1380	C ₆ H ₃ ClNO ₂ S	<i>p</i> -Chlorometamic acid	207.58	280 d.			
1381	C ₆ H ₂ Cl ₂ N ₂	2, 4-Dichlorophenylhydrazine	176.98	94			
1382	C ₆ H ₂ Cl ₂ N ₂	2, 5-Dichlorophenylhydrazine	176.98	105			
1383	C ₆ H ₂ Cl ₂ N ₂	3, 5-Dichlorophenylhydrazine	176.98	118			
1384	C ₆ H ₂ Cl ₄	α -trans-Benzenhexachloride	290.79	157	288	1.87	
1385	C ₆ H ₂ Cl ₄	β -cis-Benzenhexachloride	290.79	310		1.89 ¹⁹	

C-TABLE: C₆H₆ TO C₆H₇

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No.	Formula	Name	Mol wt	M. P	B. P.	d	R. I. No.
1386	C ₆ H ₆ Cl ₆	γ-Benzenehexachloride	290.79	112			
1387	C ₆ H ₆ Cl ₆	δ-Benzenehexachloride	290.79	129			
1388	C ₆ H ₅ FN	o-Fluoroaniline	111.05	-34.6	68.5 ¹⁴	1.151	716
1389	C ₆ H ₅ FN	m-Fluoroaniline	111.05		186.3	1.160	722
1390	C ₆ H ₅ FN	p-Fluoroaniline	111.05	-1.9	189	1.152	707
1391	C ₆ H ₅ IN	o-Iodoaniline	218.99	56.5			
1392	C ₆ H ₅ IN	m-Iodoaniline	218.99	27			
1393	C ₆ H ₅ IN	p-Iodoaniline	218.99	62			
1394	C ₆ H ₅ N ₂ O	p-Nitrosoaniline	122.06	174			
1395	C ₆ H ₅ N ₂ O ₂	Phenylnitroamine	138.06	46			
1396	C ₆ H ₅ N ₂ O ₂	o-Nitroaniline	138.06	71.5			
1397	C ₆ H ₅ N ₂ O ₂	m-Nitroaniline O ₂ NC ₆ H ₄ NH ₂	138.06	111.8	286	1.430	
1398	C ₆ H ₅ N ₂ O ₂	p-Nitroaniline	138.06	148		1.424	
1399	C ₆ H ₅ N ₂ O ₂	Quinonedioxime p-C ₆ H ₄ (NOH) ₂	138.06	240			
1400	C ₆ H ₅ N ₂ O ₂	3-Nitro-2-aminophenol	154.06	136			
1401	C ₆ H ₅ N ₂ O ₂	4-Nitro-2-aminophenol	154.06	143			
1402	C ₆ H ₅ N ₂ O ₂	5-Nitro-2-aminophenol	154.06	202			
1403	C ₆ H ₅ N ₂ O ₂	6-Nitro-2-aminophenol	154.06	111			
1404	C ₆ H ₅ N ₂ O ₂	5-Nitro-3-aminophenol	154.06	165			
1405	C ₆ H ₅ N ₂ O ₂	2-Nitro-4-aminophenol	154.06	206			
1406	C ₆ H ₅ N ₂ O ₂	3-Nitro-4-aminophenol	154.06	148			
1407	C ₆ H ₅ N ₂ O ₄	5-Acetylbarbituric acid	170.06	300			
1408	C ₆ H ₅ N ₂ O ₄	Dimethylalloxan	170.06	255 d.			
1409	C ₆ H ₅ N ₂ O ₄	1-Methyluric acid	182.08	400 d.			
1410	C ₆ H ₅ N ₂ O ₄	3-Methyluric acid	182.08	>360 d.			
1411	C ₆ H ₅ N ₂ O ₄	7-Methyluric acid	182.08	370 d.			
1412	C ₆ H ₅ N ₂ O ₇	Ammonium pierate	246.08	d.		1.719	1318
1413	C ₆ H ₅ O	Phenol	94.016	41	182	1.071 ¹⁵	1064
1414	C ₆ H ₅ O ₂	o-Dihydroxybenzene 1, 2-C ₆ H ₄ (OH) ₂ *	110.05	105	245	1.344	1272
1415	C ₆ H ₅ O ₂	Resorcinol 1, 3-C ₆ H ₄ (OH) ₂	110.05	110	276.5	1.285 ¹⁶	1275
1416	C ₆ H ₅ O ₂	Hydroquinol 1, 4-C ₆ H ₄ (OH) ₂	110.05	170.5	286.2	1.332 ¹⁶	1184
1417	C ₆ H ₅ O ₂	5-Methylfurfural	110.05	187	187	1.109 ¹⁶	
1418	C ₆ H ₅ O ₂ S	Benzenesulfonic acid	142.11	84	100 d.		
1419	C ₆ H ₅ O ₂	Pyrogallol 1, 2, 3-C ₆ H ₃ (OH) ₃	126.05	134	309	1.453	1333
1420	C ₆ H ₅ O ₂	Hydroxyhydroquinone	126.05	140.5			
1421	C ₆ H ₅ O ₂	Phloroglucinol	126.05	219			
1422	C ₆ H ₅ O ₂	Acrylic anhydride	126.05		97 ¹⁶	1.094 ⁹	
1423	C ₆ H ₅ O ₂ S	Benzenesulfonic acid	158.11	46	d		
1424	C ₆ H ₅ O ₂	Apionol 1, 2, 3, 4-C ₆ H ₂ (OH) ₄	142.05	161			
1425	C ₆ H ₅ O ₂	1, 2, 3, 5-Tetrahydroxybenzene	142.05	165			
1426	C ₆ H ₅ O ₂	1, 2, 4, 5-Tetrahydroxybenzene	142.05	220			
1427	C ₆ H ₅ O ₂	Muonic acid (CH ₃ CHCO ₂ H) ₂	142.05	320 d.			
1428	C ₆ H ₅ O ₂ S	o-Phenolsulfonic acid	174.11	50			
1429	C ₆ H ₅ O ₂	Aconitic acid	174.05	191			
1430	C ₆ H ₅ S	Thiophenol C ₆ H ₅ SH	110.11		160.5	1.074	1002
1431	C ₆ H ₅ Se	Selenophenol C ₆ H ₅ SeH	157.25		183.6	1.487 ¹⁶	
1432	C ₆ H ₅ S ₂	Dithioresorcinol 1, 3-C ₆ H ₄ (SH) ₂	142.18	27	243		
1433	C ₆ H ₅ S ₂	Dithiohydroquinone 1, 4-C ₆ H ₄ (SH) ₂	142.18	98			
1434	C ₆ H ₅ As	Phenylarsine C ₆ H ₅ AsH ₂	154.01		148		
1435	C ₆ H ₅ AsO ₂	Phenylarsonic acid	202.01	158 d.		1.840	
1436	C ₆ H ₅ BrN ₂	p-Bromophenylhydrazine	186.99	107			
1437	C ₆ H ₅ ClN ₂	4-Chloro-o-phenylenediamine	142.53	72			
1438	C ₆ H ₅ ClN ₂	4-Chloro-m-phenylenediamine	142.53	86			
1439	C ₆ H ₅ ClN ₂	o-Chlorophenylhydrazine	142.53	47			
1440	C ₆ H ₅ ClN ₂	p-Chlorophenylhydrazine	142.53	90			
1441	C ₆ H ₅ ClO	Sorbic chloride	130.51		78 ¹⁶	1.065	741
1441.1	C ₆ H ₅ ClO ₂	Methyl chloromaleate	178.51		106.5 ¹⁶	1.278 ¹⁶	
1441.2	C ₆ H ₅ ClO ₂	Methyl chlorofumarate	178.51		115.5 ¹⁶	1.200 ¹⁶	
1442	C ₆ H ₅ N	Aniline	93.062	-6.2	184.4	1.022	769
1443	C ₆ H ₅ N	α-Picoline	93.062	-69.9	128.0	0.950	604
1444	C ₆ H ₅ N	β-Picoline	93.062		143.5	0.952	1018
1445	C ₆ H ₅ N	γ-Picoline	93.062		143.1	0.957	
1446	C ₆ H ₅ NO	o-Aminophenol	109.06	170			

* Commonly known as catechol, pyrocatechol, catechin, pyrocatechin.

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1447	C ₆ H ₇ NO	<i>m</i> -Aminophenol	109.06	123			
1448	C ₆ H ₇ NO	<i>p</i> -Aminophenol	109.06	184			1333
1449	C ₆ H ₇ NO	Methyl 2-pyrrol ketone	109.06	90	220		
1450	C ₆ H ₇ NO	<i>β</i> -Phenylhydroxylamine	109.06	82			
1451	C ₆ H ₇ N ₃ O ₂	Phloramine 3, 5-(OH) ₂ C ₆ H ₃ NH ₂	125.06	152			
1452	C ₆ H ₇ NO ₂ S	Benzenesulfonamide	157.13	156			
1455	C ₆ H ₇ NO ₂ S	<i>p</i> -Anilinesulfonic acid	173.13	288			
1458	C ₆ H ₇ NS	2-Aminothiophenol	125.13	26	234		
1459	C ₆ H ₇ N ₃ O ₂	4-Nitro- <i>o</i> -phenylenediamine	153.08	198			
1460	C ₆ H ₇ N ₃ O ₂	4-Nitro- <i>m</i> -phenylenediamine	153.08	161			
1461	C ₆ H ₇ N ₃ O ₂	2-Nitro- <i>p</i> -phenylenediamine	153.08	135			
1462	C ₆ H ₇ N ₃ O ₄	<i>d</i> -Glucose pentamtrate	405.09	135 d.			
1463	C ₆ H ₇ O ₂ P	Phenylphosphinous acid	142.08	70			
1464	C ₆ H ₇ O ₂ P	Phenylphosphenic acid	158.08	158	250 d.	1.475	
1465	C ₆ H ₇ P	Phenyl phosphine C ₆ H ₅ PH ₂	110.08		160	1.001 ¹⁵	
1466	C ₆ H ₈	1, 3-Cyclohexadiene	80.062	-98	80.5	0.842	519
1467	C ₆ H ₈	Diallylene (CH ₂ C=CH) ₂	80.062		70	0.858 ^{18, 2}	
1468	C ₆ H ₈	<i>o</i> -Dihydrobenzene	80.062		78.5	0.848	
1469	C ₆ H ₈	<i>m</i> -Dihydrobenzene	80.062		80.5	0.830	
1470	C ₆ H ₈	<i>p</i> -Dihydrobenzene	80.062		85.5	0.848	
1471	C ₆ H ₈ AsNO ₂	Arsanilic acid <i>p</i> -NH ₂ C ₆ H ₄ AsO(OH) ₂	217.03	<200			
1471.1	C ₆ H ₈ BrN	Aniline hydrobromide	173.99	286			
1472	C ₆ H ₈ CN	Aniline hydrochloride	129.53	198	245	1.222 ⁴	1245
1474	C ₆ H ₈ CINO	<i>m</i> -Aminophenol hydrochloride	145.53	229			
1475	C ₆ H ₈ CINO	<i>p</i> -Aminophenol hydrochloride	145.53	306 d.			1333
1476	C ₆ H ₈ Cl ₂ O ₂	Adipyl dichloride	182.98		132 ¹⁸ s. d.		
1477	C ₆ H ₈ N	Piturine	94.070		244		
1478	C ₆ H ₈ N ₂	Adipyl dimtrile	108.08	1	295	0.951 ¹⁹	471
1479	C ₆ H ₈ N ₂	<i>o</i> -Phenylenediamine	108.08	103.8	252		
1480	C ₆ H ₈ N ₂	<i>m</i> -Phenylenediamine	108.08	62.8	287	1.107 ^{17, 7}	1086
1481	C ₆ H ₈ N ₂	<i>p</i> -Phenylenediamine	108.08	139.7	267		
1482	C ₆ H ₈ N ₂	2, 5-Dimethylpyrazine (Ketene)	108.08	15	155	0.990	1017
1483	C ₆ H ₈ N ₂	Phenylhydrazine C ₆ H ₅ NHNH ₂	108.08	19.6	243.5	1.098	784
1484	C ₆ H ₈ N ₂ O	2, 5-Diaminophenol	124.08	68			
1485	C ₆ H ₈ N ₂ O	3, 4-Diaminophenol	124.08	168			
1486	C ₆ H ₈ N ₂ O	3, 5-Diaminophenol	124.08	170			
1487	C ₆ H ₈ N ₂ O ₄	1, 3-Dimethylbarbituric acid	156.08	123			
1488	C ₆ H ₈ N ₂ O ₄	1-Ethylbarbituric acid	156.08	120			
1489	C ₆ H ₈ N ₂ O ₄	Aniline nitrate	156.08		190 d.	1.358 ⁴	
1490	C ₆ H ₈ N ₂ O ₄ S	<i>o</i> -Phenylenediamine-3-sulfonic acid	188.14	d.			
1491	C ₆ H ₈ N ₂ O ₄ S	<i>p</i> -Phenylhydrazinesulfonic acid	188.14	286			
1492	C ₆ H ₈ N ₂ O ₄ S ₂	<i>o</i> -Benzenedisulfonamide	236.21	233			
1493	C ₆ H ₈ N ₂ O ₄ S ₂	<i>m</i> -Benzenedisulfonamide	236.21	229			
1494	C ₆ H ₈ N ₂ O ₄ S ₂	<i>p</i> -Benzenedisulfonamide	236.21	188			
1495	C ₆ H ₈ N ₆ O ₁₆	Manitol hexanitrate	452.11	113		1.8	
1496	C ₆ H ₈ O	2, 5-Dimethylfuran	96.062		94	0.888	974
1497	C ₆ H ₈ O ₂	Dihydroresoreinol <i>m</i> -(OH) ₂ C ₆ H ₄	112.06	104			
1498	C ₆ H ₈ O ₂	Sorbic acid CH ₃ (CH=CH) ₂ CO ₂ H	112.06	134.5	228 d.		1333
1499	C ₆ H ₈ O ₄	Dimethyl fumarate	144.06	102	192		
1500	C ₆ H ₈ O ₄	Dimethyl maleate	144.06		203	1.153 ¹⁴	382
1501	C ₆ H ₈ O ₄	Ethyl fumarate CO ₂ HCH=CHCO ₂ C ₂ H ₅	144.06	70			
1502	C ₆ H ₈ O ₄	Lactide	144.06	125	255	0.862	
1503	C ₆ H ₈ O ₄	Acetylmalonic acid	160.06	150			
1504	C ₆ H ₈ O ₄	Acetylmalic acid	160.06	134			
1504.1	C ₆ H ₈ O ₄	1-Ketoadipic acid	160.06	124			
1505	C ₆ H ₈ O ₄	Tricarballic acid	176.06	166	d.		
1506	C ₆ H ₈ O ₄	Glycerol triformate (Triformin)	176.06	18	266	1.320	373
1507	C ₆ H ₈ O ₇	Citric acid (HO) ₂ C(CH ₂) ₂ C(OH)CO ₂ H	192.06	153		1.542	1202
1508	C ₆ H ₈ O ₈	Hydroxycitric acid	208.06	160			
1509	C ₆ H ₈ S	2, 3-Dimethylthiophene	112.13		137	0.994	
1510	C ₆ H ₈ S	2, 4-Dimethylthiophene	112.13		138	0.996	
1511	C ₆ H ₈ S	2, 5-Dimethylthiophene	112.13		137.5	0.976 ^{17, 6}	
1512	C ₆ H ₈ S	3, 4-Dimethylthiophene	112.13		146	1.008 ^{18, 6}	

C-TABLE: C₆H₈ TO C₆H₁₆

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1513	C ₆ H ₇ AsO ₄	Arsenic acetate	252.03	82	170 ¹¹		
1514	C ₆ H ₇ CIN ₂	Phenylhydrazine hydrochloride	144.54	243			
1515	C ₆ H ₇ ClO ₂	Ethyl chloroacetoacetate	164.53		200	1.179 ¹¹	
1516	C ₆ H ₇ N	1, 2-Dimethylpyrrol	95.077		65 ¹⁴		
1517	C ₆ H ₇ N	2, 3-Dimethylpyrrol	95.077		165		
1518	C ₆ H ₇ N	2, 4-Dimethylpyrrol	95.077		171	0.927 ¹⁴	829
1519	C ₆ H ₇ N	2, 5-Dimethylpyrrol	95.077		169	0.935	909
1520	C ₆ H ₇ N	1-Ethylpyrrol	95.077		131	0.888 ¹⁴	
1521	C ₆ H ₇ NO ₂	Guavacine	127.08	285 d.			
1522	C ₆ H ₇ NO ₂	Triacetamide (CH ₃ CO) ₂ N	113.08	79			
1523	C ₆ H ₇ NO ₂ S	Ammonium benzenesulfonate	175.14	256			
1524	C ₆ H ₇ NO ₂ S	<i>m</i> -Aminophenol sulfate	207.14	152			
1525	C ₆ H ₇ N ₃	1, 2, 3-Triaminobenzene	123.09	103	336		
1526	C ₆ H ₇ N ₃	1, 2, 4-Triaminobenzene	123.09	100	340		
1527	C ₆ H ₇ N ₃ O	2, 4, 6-Triaminophenol	139.09		257		
1528	C ₆ H ₇ N ₃ O ₂	Cupferron	155.09	164			
1529	C ₆ H ₇ N ₃ O ₂	Histidine	155.09	253 d.			
1530	C ₆ H ₇ N ₃ O ₂	Phloroglucinol trioxime	171.09	155 exp.			
1531	C ₆ H ₇ N ₃ O ₄	Caffuric acid	187.09	220			
1532	C ₆ H ₁₀	<i>n</i> -Butylacetylene C ₄ H ₉ C≡CH	82.077	-150	71.5		
1533	C ₆ H ₁₀	Diisopropenyl (CH ₃ C(CH ₃) ₂) ₂	82.077		69.6	0.731 ¹⁶	852
1534	C ₆ H ₁₀	1, 5-Hexadiene (CH ₂ CH=CHCH ₂) ₂	82.077		60	0.688	127
1535	C ₆ H ₁₀	2, 4-Hexadiene (CH ₃ CH=CHCH ₃) ₂	82.077		82	0.718	810
1536	C ₆ H ₁₀	Methylpropylacetylene CH ₃ CC≡CCH ₃	82.077		84	0.749 ⁹	
1537	C ₆ H ₁₀	1, 2, 3, 4-Tetrahydrobenzene	82.077	-103.7	83	0.810	404
1539	C ₆ H ₁₀ CIN ₂ O ₂	Histidine hydrochloride	191.56	251 d.			
1540	C ₆ H ₁₀ N ₄ O ₁₀	Tetranitrodiglycerol	316.11		250 ⁸	1.33	
1541	C ₆ H ₁₀ O	Cyclohexanone	98.077		156.7	0.949	874
1542	C ₆ H ₁₀ O	1, 2, 3, 4-Tetrahydrophenol	98.077		160 d.		
1543	C ₆ H ₁₀ O	1, 2, 3, 6-Tetrahydrophenol	98.077		166		
1544	C ₆ H ₁₀ O	Allyl ether (CH ₂ CHCH ₂) ₂ O	98.077		94.3	0.805	
1545	C ₆ H ₁₀ O	1-Ethyl-2-methylacrolein	98.077		137.3	0.858	
1546	C ₆ H ₁₀ O	Allylacetone CH ₂ :CH(CH ₃) ₂ COCH ₃	98.077		129.5	0.846	876
1547	C ₆ H ₁₀ O	Diethylketene (C ₂ H ₅) ₂ C=CO	98.077		89.5	0.831	
1548	C ₆ H ₁₀ O	Mesityl oxide (CH ₃) ₂ C=CHCOCH ₃	98.077	-59.0	135	0.863	899
1549	C ₆ H ₁₀ O ₂	Adipyl dialdehyde OCH(CH ₂) ₄ CHO	114.08		94 ⁹		
1550	C ₆ H ₁₀ O ₂	Propionylpropionic aldehyde	114.08	40	166		
1551	C ₆ H ₁₀ O ₂	Acetonylacetone (CH ₃ COCH ₂) ₂	114.08	-9	194	0.970	428
1552	C ₆ H ₁₀ O ₂	α -Ethylcrotonic acid	114.08	45	209		
1553	C ₆ H ₁₀ O ₂	1, 2-Hexenic acid C ₆ H ₉ CH=CHCO ₂ H	114.08	32	217	0.965	1055
1554	C ₆ H ₁₀ O ₂	2, 3-Hexenic acid	114.08		208	0.962	953
1555	C ₆ H ₁₀ O ₂	1, 2-Isohexenic acid	114.08		108 ¹²	0.959	885
1556	C ₆ H ₁₀ O ₂	Crotonyl acetate	114.08		129	0.934 ⁹	
1557	C ₆ H ₁₀ O ₂	Ethyl α -crotonate	114.08		139	0.919	283
1558	C ₆ H ₁₀ O ₂	Ethyl isocrotonate	114.08		131.2	0.925	
1559	C ₆ H ₁₀ O ₂	Glyceryl ether	130.08		173	1.091	
1560	C ₆ H ₁₀ O ₂	Propionic anhydride (CH ₃ CH ₂ CO) ₂ O	130.08	-45.0	196.0	1.012	142
1561	C ₆ H ₁₀ O ₂	Ethyl acetoacetate	130.08	< -80	180	1.025	243
1562	C ₆ H ₁₀ O ₄	Adipic acid HO ₂ C(CH ₂) ₄ CO ₂ H	146.08	151	265 ¹⁰⁰		
1563	C ₆ H ₁₀ O ₄	1, 1-Dimethylsuccinic acid	146.08	142	165 d.		
1564	C ₆ H ₁₀ O ₄	Ethylsuccinic acid	146.08	98			
1565	C ₆ H ₁₀ O ₄	Methylethylmalonic acid	146.08	117.5			
1566	C ₆ H ₁₀ O ₄	Propylmalonic acid C ₃ H ₇ CH(CO ₂ H) ₂	146.08	96			
1567	C ₆ H ₁₀ O ₄	Isopropylmalonic acid	146.08	87			
1568	C ₆ H ₁₀ O ₄	Dimethyl succinate (CH ₃ CO ₂ CH ₃) ₂	146.08	19.5	192.8	1.121	942
1569	C ₆ H ₁₀ O ₄	Dimethyl isosuccinate	146.08		179	1.028 ¹⁰	
1570	C ₆ H ₁₀ O ₄	Diethyl oxalate (CO ₂ C ₂ H ₅) ₂	146.08	-40.6	186.1	1.080	182
1571	C ₆ H ₁₀ O ₄	Glycol diacetate (CH ₂ OCOCH ₃) ₂	146.08	-31	190.5	1.104	216
1572	C ₆ H ₁₀ O ₄	Ethylidene diacetate	146.08		169	0.852	
1572.1	C ₆ H ₁₀ O ₄	Methyl <i>l</i> -1-acetoxypropionate	146.08		172	1.089	
1573	C ₆ H ₁₀ O ₄	Mannide	146.08		317		
1574	C ₆ H ₁₀ O ₄	Isomannide	146.08	87	274		
1575	C ₆ H ₁₀ O ₄	Lactic anhydride (CH ₃ CHOHCO) ₂	162.08	260 d.			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1576	C ₈ H ₁₆ O ₄	Dimethyl malate	162 08		242	1.233	391
1577	C ₆ H ₁₀ O ₄	<i>β</i> -Glucosan	162 08	178			
1578	(C ₆ H ₁₀ O ₅) _x	Glycogen	(162.08) _x	240			
1578 1	(C ₆ H ₁₀ O ₅) _x	Starch	(162.08) _x	d.		1.50 ¹¹	1164
1579	C ₆ H ₁₀ O ₄	<i>d</i> -Saccharine	162 08	161			
1580	C ₈ H ₁₆ O ₄	Dimethyl <i>dl</i> -tartrate (CH(OH)CO ₂ CH ₃) ₂	178 08	85	282		
1581	C ₈ H ₁₆ O ₄	Dimethyl <i>d</i> -tartrate	178 08	48; 61 5	280	1 328	
1582	C ₈ H ₁₆ O ₄	Ethyl <i>d</i> -tartrate	178 08	90			
1583	C ₆ H ₁₀ O ₄	Allomucic acid	210 08	171 d.			
1584	C ₆ H ₁₀ O ₄	Mucic acid HO ₂ C(CHOH) ₄ CO ₂ H	210 08	206 d.			
1585	C ₆ H ₁₀ O ₄	<i>d</i> (<i>l</i>)-Talmucic acid	210 08	158 d.			
1586	C ₆ H ₁₀ O ₄	Isosaccharic acid	210 08	185			
1587	C ₆ H ₁₀ S	Diallyl sulfide (CH ₂ .CHCH ₂) ₂ S	114 14	-83 0	138 7	0 888 ^{24,4}	1034
1588	C ₆ H ₁₁ Br	Cyclohexyl bromide	163 00		165 5	1.333	575
1589	C ₆ H ₁₁ BrN ₂ O ₂	Bromural	223 02	154			
1590	C ₆ H ₁₁ BrO ₂	1-Bromocaproic acid C ₅ H ₉ CHBrCO ₂ H	195 00		131 ¹⁰		
1591	C ₆ H ₁₁ BrO ₂	2-Bromocaproic acid	195 00	35			
1592	C ₆ H ₁₁ BrO ₂	Ethyl 1-bromobutyrate	195 00		179 d.	1 325 ²³	
1593	C ₆ H ₁₁ BrO ₂	Ethyl 1-bromoisobutyrate	195 00		164 d.	1 315 ²³	
1595	C ₆ H ₁₁ Cl	Cyclohexyl chloride	118 54		142 5	0 973	451
1596	C ₆ H ₁₁ ClO	<i>n</i> -Caproyl chloride C ₅ H ₁₁ COCl	134 54		153		543
1597	C ₆ H ₁₁ ClO ₂	Isomyl chloroformate	150 54		156	1 024 ²³	
1598	C ₆ H ₁₁ Cl ₂ N ₂ O ₂	Histidine dihydrochloride	228 03	235 d.			
1599	C ₆ H ₁₁ Cl ₃ O ₂	Trichloroacetal C ₅ H ₉ C(CH ₂ OC ₂ H ₅) ₂	221 46		197	1.266 ¹⁵	
1600	C ₆ H ₁₁ Cl ₃ O ₂	Trichloroacetal (solid)	221 46	83	230 d.		
1601	C ₆ H ₁₁ I	Cyclohexyl iodide	210 02		192	1.626	
1602	C ₆ H ₁₁ N	Cupronitrile C ₅ H ₁₁ CN	97 09		163	0.809	188
1603	C ₆ H ₁₁ N	Isocapronitrile (CH ₃) ₂ CH(CH ₂) ₄ CN	97 09	-51 1	155 5	0.806	159
1604	C ₆ H ₁₁ N	Isocaproisomitrile (CH ₃) ₂ CH(CH ₂) ₃ NC	97.09		137		
1605	C ₆ H ₁₁ NO ₂	Hygrie acid	129 09	169			
1606	C ₆ H ₁₁ NO ₂	Nitrocyclohexane	129 09	-34	205 5	1 068	
1607	C ₆ H ₁₁ NO ₂	Adipyl amide HO ₂ C(CH ₂) ₄ CONH ₂	145 09	130			
1608	C ₆ H ₁₁ NS	Isomyl isothiocyanate	129 16		182		
1609	C ₆ H ₁₁ N ₂ O ₄	Citramide (H ₂ NOC(CH ₂) ₃ C(OH)CONH ₂)	189 11	215			
1610	C ₈ H ₁₂	Butylethylene C ₄ H ₉ CH=CH ₂	84 092	-98 5	64 1	0.683	44
1611	C ₈ H ₁₂	2, 2-Dimethyl-4-butene	84 092		42 3		
1612	C ₈ H ₁₂	Cyclohexane	84 092	6 5	81 4	0.779	304
1613	C ₈ H ₁₂	2-Methyl-2-pentene (CH ₃) ₂ C=CHC ₂ H ₅	84 092		67 1	0.692	881
1615	C ₈ H ₁₂	Methylcyclopentane	84 092	-140 5	73	0.750	
1616	C ₈ H ₁₂	3-Methyl-2-pentene (isomer 1)	84 092		65 7	0.722 ¹⁵	848
1617	C ₈ H ₁₂	3-Methyl-2-pentene (isomer 2)	84 092		70.2	0 698	128
1618	C ₈ H ₁₂	2, 3-Dimethyl-1-butene	84 092		59	0.680 ⁹	
1619	C ₈ H ₁₂	Tetramethylethylene	84 092		73	0 712	199
1620	C ₈ H ₁₃ As ₂	Cacodyl carbide	234 01		81 5 ¹⁵		
1621	C ₈ H ₁₃ As ₂ BiO ₄	Bismuth cacodylate (8H ₂ O)	613 97	82			
1622	C ₈ H ₁₃ Cl ₃ O ₂	Dichloroacetal C ₅ H ₉ C(CH ₂ OC ₂ H ₅) ₂	187 01		184	1 138 ¹⁴	
1623	C ₈ H ₁₃ N ₂ O ₂	Adipic diamide H ₂ NOC(CH ₂) ₄ CONH ₂	144 11	220			
1624	C ₈ H ₁₃ N ₂ O ₂	<i>sym</i> -Diethyloxamide	144 11	190			
1625	C ₈ H ₁₃ N ₂ O ₂ S ₂	<i>L</i> -Cystine	240 24	258 d.			1187
1626	C ₈ H ₁₅ N ₄	Hexamethylenetetramine	140 12		263		
1627	C ₈ H ₁₅ O	Cyclohexanol	100.09	23 9	161 5	0 962	1051
1628	C ₈ H ₁₅ O	2-Hexene-4-ol	100 09		59 ²⁷	0 837	1008
1629	C ₈ H ₁₅ O	Dimethyl propenyl carbinol	100.09		112	0 835	321
1630	C ₈ H ₁₅ O	Pinacolm (CH ₃) ₂ CC(OC ₂ H ₅) ₂	100.09	-52 5	106.2	0 811	
1631	C ₈ H ₁₅ O	Ethyl isocrotonyl ether	100.09		94		
1632	C ₈ H ₁₅ O	Isopropyl allyl ether	100.09		84 2	0 776	
1633	C ₈ H ₁₅ O	<i>n</i> -Caproic aldehyde C ₅ H ₁₁ CHO	100.09		129	0 834	
1634	C ₈ H ₁₅ O	Isobutyraldehyde	100.09		121.7		
1635	C ₈ H ₁₅ O	Methylpropylacetaldehyde	100 09		121		
1636	C ₈ H ₁₅ O	Ethyl propyl ketone C ₅ H ₉ COC ₂ H ₅	100 09		124	0 818 ^{17, 6}	124
1637	C ₈ H ₁₅ O	Ethyl isopropyl ketone	100 09		114.5	0 830 ⁹	
1638	C ₈ H ₁₅ O	Methyl <i>n</i> -butyl ketone CH ₃ COC ₄ H ₉	100 09	-56 9	127.2	0 830 ⁹	
1639	C ₈ H ₁₅ O	Methyl isobutyl ketone	100.09	-84.7	119	0.803	96

C-TABLE: C₆H₁₁ TO C₆H₁₃

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No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1640	C ₆ H ₁₁ O	Methyl <i>sec.</i> -butyl ketone	100.09		117.8	0.815	115
1641	C ₆ H ₁₁ O ₂	Diacetone alcohol	116.09		100	0.931 ¹⁰	
1642	C ₆ H ₁₁ O ₂	<i>tert.</i> -Butylacetic acid	116.09	-11	100		
1643	C ₆ H ₁₁ O ₂	Caproic acid C ₆ H ₁₁ CO ₂ H	116.09	-9.5	202	0.920	207
1644	C ₆ H ₁₁ O ₂	Isocaproic acid	116.09	-35	207.7	0.925	217
1645	C ₆ H ₁₁ O ₂	Diethylacetic acid (C ₂ H ₅) ₂ CHCO ₂ H	116.09	-15	197	0.933 ¹⁰	201
1646	C ₆ H ₁₁ O ₂	Dimethylethylacetic acid	116.09	-14	187		
1647	C ₆ H ₁₁ O ₂	Methylpropylacetic acid	116.09		193.5	0.928	
1648	C ₆ H ₁₁ O ₂	<i>n</i> -Amyl formate HCO ₂ C ₅ H ₁₁	116.09		130.4	0.902 ⁰	
1649	C ₆ H ₁₁ O ₂	Isoamyl formate	116.09		123.5	0.871	83
1650	C ₆ H ₁₁ O ₂	<i>tert.</i> -Amyl formate	116.09		113	0.806 ¹⁰	
1651	C ₆ H ₁₁ O ₂	<i>n</i> -Butyl acetate CH ₃ CO ₂ C ₄ H ₉	116.09	-76.8	126.5	0.882	95
1652	C ₆ H ₁₁ O ₂	Isobutyl acetate CH ₃ CO ₂ CH ₂ CH(CH ₃) ₂	116.09	-98.9	118.3	0.871	118
1653	C ₆ H ₁₁ O ₂	<i>sec.</i> -Butyl acetate	116.09		112.2	0.870	73
1654	C ₆ H ₁₁ O ₂	Ethyl <i>n</i> -butyrate C ₂ H ₅ CO ₂ C ₄ H ₉	116.09	-93.3	121.3	0.879	91
1655	C ₆ H ₁₁ O ₂	Ethyl isobutyrate	116.09	-88.2	111.7	0.871	80
1656	C ₆ H ₁₁ O ₂	Methyl trimethylacetate	116.09		102	1.044 ⁰	
1657	C ₆ H ₁₁ O ₂	Methyl <i>n</i> -valerate C ₄ H ₉ CO ₂ CH ₃	116.09		127.3	0.910 ⁰	
1658	C ₆ H ₁₁ O ₂	Methyl isovalerate	116.09		116.7	0.881	
1659	C ₆ H ₁₁ O ₂	<i>n</i> -Propyl propionate C ₃ H ₇ CO ₂ C ₃ H ₇	116.09	-75.9	123.4	0.883	92
1660	C ₆ H ₁₁ O ₂	Isopropyl propionate	116.09		111.3	0.893 ⁰	
1661	C ₆ H ₁₂ O ₂	Phloroglucite	132.09	185			
1662	C ₆ H ₁₂ O ₂	Paraldehyde (CH ₃ CHO) ₃	132.09	10.5	124	0.994	244
1663	C ₆ H ₁₂ O ₂	1-Hydroxy- <i>n</i> -caproic acid	132.09	62			
1664	C ₆ H ₁₂ O ₂	1-Hydroxyisocaproic acid	132.09	81			
1665	C ₆ H ₁₂ O ₂	<i>dl</i> -1-Hydroxyisocaproic acid	132.09	76			
1666	C ₆ H ₁₂ O ₂	1-Hydroxy-1, 1-diethylacetic acid	132.09	74.5			
1667	C ₆ H ₁₂ O ₂	Methyl <i>n</i> -butyl carbonate	132.09		151		
1668	C ₆ H ₁₂ O ₂	Fucose	164.09	145			
1669	C ₆ H ₁₂ O ₂	Mannitan	164.09	137			
1670	C ₆ H ₁₂ O ₂	<i>d</i> -Quercitol	164.09	234		1.585 ¹⁰	
1671	C ₆ H ₁₂ O ₂	<i>l</i> -Quercitol	164.09	174			
1672	C ₆ H ₁₂ O ₂ (H ₂ O)	β -Rhamnose	164.09	126		1.471	1219
1673	C ₆ H ₁₂ O ₂	Rhodoose	164.09	144			
1674	C ₆ H ₁₂ O ₂	<i>d</i> -Fructose (Levulose)	180.09	104		1.069 ¹⁷	
1675	C ₆ H ₁₂ O ₂	<i>d</i> , α -Galactose	180.09	168			
1675.1	C ₆ H ₁₂ O ₂	<i>d</i> , β -Galactose	180.09	168			
1676	C ₆ H ₁₂ O ₂	<i>dl</i> -Galactose	180.09	144			
1677	C ₆ H ₁₂ O ₂	<i>d</i> , α -Glucose	180.09	146		1.544 ²⁰	
1678	C ₆ H ₁₂ O ₂	<i>d</i> , β -Glucose	180.09	150			
1679	C ₆ H ₁₂ O ₂	<i>d</i> (<i>l</i>)-Inositol	180.09	247	250 ^{VAR.}		
1680	C ₆ H ₁₂ O ₂	Dambose	180.09	224	<i>d</i> .	1.752	
1681	C ₆ H ₁₂ O ₂	α -Mannose	180.09	133	205 <i>d</i> .		
1682	C ₆ H ₁₂ O ₂	<i>d</i> -Mannose	180.09	132		1.539	
1683	C ₆ H ₁₂ O ₂	<i>dl</i> -Mannose	180.09	133			
1684	C ₆ H ₁₂ O ₂	<i>d</i> (<i>l</i>)-Sorbitose	180.09	154		1.612	
1685	C ₆ H ₁₂ O ₂	<i>dl</i> -Sorbitose	180.09	154		1.638	
1686	C ₆ H ₁₂ O ₂	<i>d</i> -Tagatose	180.09	124			
1687	C ₆ H ₁₂ S	Cyclohexyl mercaptan	116.16		160		
1688	C ₆ H ₁₂ S ₂	α -Trithioacetaldehyde	180.29	101	247		
1689	C ₆ H ₁₂ S ₂	β -Trithioacetaldehyde (C ₂ H ₄ S) ₂	180.29	126			
1690	C ₆ H ₁₂ S ₂	γ -Trithioacetaldehyde	180.29	81	100		
1690.1	C ₆ H ₁₂ Se	Hexamethyl selenide	163.29		172	1.122	
1691	C ₆ H ₁₃ Br	2-Bromo-2, 3-dimethylbutane	165.02	13	132		
1692	C ₆ H ₁₃ Br	<i>n</i> -Hexyl bromide C ₆ H ₁₃ CH ₂ Br	165.02		156	1.173	422
1693	C ₆ H ₁₃ BrO ₂	Bromoacetal BrCH ₂ CH(OC ₂ H ₅) ₂	197.02		170		
1694	C ₆ H ₁₃ Cl	2-Chloro-2, 3-dimethylbutane	120.56	-10.4	112.1	0.875 ²⁰	
1695	C ₆ H ₁₃ Cl	<i>n</i> -Hexyl chloride C ₆ H ₁₃ CH ₂ Cl	120.56		134	0.872	238
1696	C ₆ H ₁₃ ClN ₄ O ₄	Hexamethylenetetramine perchlorate	240.59	158			
1697	C ₆ H ₁₃ I	<i>n</i> -Hexyl iodide C ₆ H ₁₃ CH ₂ I	212.03		180	1.441	560
1698	C ₆ H ₁₃ IO ₂	Iodoacetal IOCH ₂ CH(OC ₂ H ₅) ₂	244.03		132 ²⁰	1.494 ¹⁰	
1699	C ₆ H ₁₃ N	1-Methylpiperidine	99.108		107	0.818	416
1700	C ₆ H ₁₃ N	2-Methylpiperidine (α -Pipicoline)	99.108		119	0.844 ²²	1016

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1701	C ₈ H ₁₃ N	3-Methylpiperidine (β -Pipicoline).	99.108		126	0.845 ^{24,25}	1020
1702	C ₈ H ₁₃ N	4-Methylpiperidine (γ -Pipicoline).....	99.108		129	0.867 ^o	
1703	C ₈ H ₁₃ NO ₂	Hedonal H ₂ NCO ₂ CH(CH ₃)C ₂ H ₅ ...	131.11	74	215		
1704	C ₈ H ₁₃ NO ₂	Isoamyl carbamate	131.11	63.5	220		
1704.1	C ₈ H ₁₃ NO ₂	Propyl urethane C ₃ H ₇ NHCO ₂ C ₂ H ₅	131.11		186	0.992 ¹⁴	
1705	C ₈ H ₁₃ NO ₂	<i>l</i> -Leucine (CH ₃) ₂ CHCH(NH ₂)CO ₂ H	131.11	295		1.293	1221
1706	C ₈ H ₁₃ NO ₂	<i>dl</i> -Leucine	131.11	290			
1707	C ₈ H ₁₃ NO ₂	<i>dl</i> -Isoleucine	131.11	280 d.			
1708	C ₈ H ₁₃ NO ₂	<i>dl</i> -Isoleucine	131.11	275			
1709	C ₈ H ₁₃ NO ₂	<i>d</i> -Glucosamine	179.11	110 d.			
1710	C ₈ H ₁₃ NO ₂	<i>d</i> -Glucosamine	179.11	128			
1711	C ₈ H ₁₃ NO ₂	<i>d</i> -Glucosamine	195.11	138			
1712	C ₈ H ₁₄	Diosopropyl (CH ₃) ₂ CHCH(CH ₃) ₂	86.108	-135.1	58.1	0.666 ¹⁵	38
1713	C ₈ H ₁₄	<i>n</i> -Hexane CH ₃ (CH ₂) ₄ CH ₃	86.108	-94.3	69.0	0.660	32
1714	C ₈ H ₁₄	3-Methylpentane (C ₂ H ₅) ₂ CHCH ₂	86.108		64	0.668	34
1715	C ₈ H ₁₄	2-Methylpentane (CH ₃) ₂ CHC ₂ H ₅	86.108		60.0	0.654	27
1716	C ₈ H ₁₄	2,2-Dimethylbutane (CH ₃) ₂ CC ₂ H ₅	86.108	-98.2	49.7	0.649	23
1717	C ₈ H ₁₄ INO ₂	<i>d</i> -Glucosamine hydromethide	307.05	165 d.			
1718	C ₈ H ₁₄ N ₂	α , 2, 5-Dimethylpiperazine	114.12	119	162		
1719	C ₈ H ₁₄ N ₂ O	Diacetoneaminoxime	130.12	58	135 ¹⁷		
1720	C ₈ H ₁₄ N ₂ O	Dipropylhydrosamine (C ₃ H ₇) ₂ NNO	130.12		205		
1721	C ₈ H ₁₄ N ₂ O ₇	Ammonium citrate	226.12			1.483	
1722	C ₈ H ₁₄ N ₂ O ₂	Arginine	174.14	207.5 d.			
1723	C ₈ H ₁₄ O	<i>tert</i> -Amyl carbinol	102.11		135	0.844 ^o	
1724	C ₈ H ₁₄ O	Isobutyl alcohol	102.11		165	0.840 ^o	429
1725	C ₈ H ₁₄ O	Dimethylisopropyl carbinol	102.11	-14	122	0.823	
1726	C ₈ H ₁₄ O	Ethylpropyl carbinol	102.11		135	0.819	
1726.1	C ₈ H ₁₄ O	<i>l</i> (<i>d</i>)-Ethylpropyl carbinol	102.11		134 ²³	0.825 ^{13,25}	211
1727	C ₈ H ₁₄ O	Ethylisopropyl carbinol	102.11		128	0.824	
1728	C ₈ H ₁₄ O	<i>n</i> -Hexyl alcohol C ₆ H ₁₃ OH	102.11	-51.6	155.8	0.820	
1730	C ₈ H ₁₄ O	Methylbutyl carbinol	102.11		131.9	0.803 ²⁴	183
1730.1	C ₈ H ₁₄ O	<i>d</i> -Methylbutyl carbinol	102.11		138	0.815	205
1732	C ₈ H ₁₄ O	Methyl- <i>sec</i> -butyl carbinol	102.11		134	0.831 ¹⁸	245
1733	C ₈ H ₁₄ O	Pinacolyl alcohol (CH ₃) ₂ CH(OH)CH ₂	102.11	5.5	121	0.812 ²⁶	
1733.1	C ₈ H ₁₄ O	<i>d</i> -Pinacolyl alcohol	102.11		120	0.820	214
1734	C ₈ H ₁₄ O	Methyldiethyl carbinol	102.11	-22	122.6	0.824	242
1735	C ₈ H ₁₄ O	3-Methyl-3-ethylpropyl alcohol	102.11		152.1	0.830 ¹⁶	
1736	C ₈ H ₁₄ O	2-Methyl-2-propylethyl alcohol	102.11		147.9	0.829	231
1737	C ₈ H ₁₄ O	Ethyl <i>n</i> -butyl ether C ₂ H ₅ OC ₂ H ₅	102.11		91.4	0.752	
1738	C ₈ H ₁₄ O	Ethyl isobutyl ether	102.11		80	0.751	
1739	C ₈ H ₁₄ O	Methyl <i>n</i> -amyl ether C ₂ H ₅ OCH ₂	102.11		88.5	0.754	53
1740	C ₈ H ₁₄ O	Methyl isomethyl ether	102.11		91	0.687 ²¹	
1741	C ₈ H ₁₄ O	Propyl ether (C ₃ H ₇) ₂ O	102.11	-122.0	89	0.747	41
1742	C ₈ H ₁₄ O	Isopropyl ether [(CH ₃) ₂ CH] ₂ O	102.11		68.7	0.735 ^{18,2}	
1743	C ₈ H ₁₄ O ₂	Pinacene [(CH ₃) ₂ COH] ₂	118.11	38	172.8		
1744	C ₈ H ₁₄ O ₂	Hexane-1, 5-diol	118.11		233	0.981 ^o	
1745	C ₈ H ₁₄ O ₂	Hexane-1, 6-diol HOCH ₂ (CH ₂) ₄ CH ₂ OH	118.11	42	250		
1746	C ₈ H ₁₄ O ₂	Acetal CH ₃ CH(OC ₂ H ₅) ₂	118.11		102.2	0.831	42
1747	C ₈ H ₁₄ O ₃	Diglycerol [(HO) ₂ C ₂ H ₃] ₂ O	166.11		230 ¹⁰		
1748	C ₈ H ₁₄ O ₃	Fucitol	166.11	153			
1749	C ₈ H ₁₄ O ₃	Rhamnitol	166.11	121			
1750	C ₈ H ₁₄ O ₄	Dulcitol	182.11	188	205 ^{3,6}	1.466 ¹⁵	1333
1751	C ₈ H ₁₄ O ₄	<i>d</i> -Mannitol	182.11	166.1	295 ^{3,6}	1.489	1333
1752	C ₈ H ₁₄ O ₄	<i>d</i> -Sorbitol	182.11	110			1333
1753	C ₈ H ₁₄ O ₄	<i>d</i> -Taitol	182.11	86			
1754	C ₈ H ₁₄ S	Dipropyl sulfide (C ₃ H ₇) ₂ S	118.17		142	0.814	
1755	C ₈ H ₁₄ S	Diosopropyl sulfide [(CH ₃) ₂ CH] ₂ S	118.17		120.4		
1756	C ₈ H ₁₄ As	Triethyl arsine (C ₂ H ₅) ₃ As	162.08		141 d.	1.150	495
1757	C ₈ H ₁₄ AsO ₃	Triethyl arsenite (C ₂ H ₅ O) ₃ As	210.08		166	1.224 ^o	
1758	C ₈ H ₁₄ AsO ₄	Triethyl arsenate (C ₂ H ₅ O) ₃ AsO	226.08		238	1.326 ^o	
1759	C ₈ H ₁₄ Bi	Triethyl bismuthine (C ₂ H ₅) ₃ Bi	296.12		107 ¹⁹	1.82	
1760	C ₈ H ₁₄ N	<i>Di-n</i> -propylamine (C ₃ H ₇) ₂ NH	101.12	-39.6	110.7	0.738	149
1761	C ₈ H ₁₄ N	Diosopropylamine [(CH ₃) ₂ CH] ₂ NH	101.12		84	0.722 ²²	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1762	C ₆ H ₁₁ N	<i>n</i> -Hexylamine C ₆ H ₁₃ NH ₂	101.12		128		
1762.1	C ₆ H ₁₁ N	2-Hexylamine C ₆ H ₁₃ CH(NH ₂)CH ₃	101.12	-10	130 ¹⁴	0.767 ^{16,4}	
1763	C ₆ H ₁₁ N	Isohexylamine (CH ₃) ₂ CH(CH ₂) ₃ NH ₂	101.12	-94.4	123.9		
1764	C ₆ H ₁₁ N	Triethylamine (C ₂ H ₅) ₃ N	101.12	-114.8	89.5	0.728	129
1765	C ₆ H ₁₁ NO ₂	Aminoacetal H ₂ NCH ₂ CH(OC ₂ H ₅) ₂	133.12		163		
1766	C ₆ H ₁₁ N ₃	Acetaldehydeammonia (trimeric)	129.14	85			
1767	C ₆ H ₁₁ O ₂ P	Triethyl phosphite (C ₂ H ₅ O) ₃ P	166.14		150.5	1.076 ^{13,4}	169
1768	C ₆ H ₁₁ O ₂ P	Triethyl phosphate (C ₂ H ₅ O) ₃ PO	182.14		216	1.072 ¹³	150
1769	C ₆ H ₁₁ P	Triethylphosphine (C ₂ H ₅) ₃ P	118.14		128	0.800	413
1769.1	C ₆ H ₁₁ PS	Triethyl phosphinesulfide	150.20	94			1182
1770	C ₆ H ₁₁ Sb	Triethyl stibine (C ₂ H ₅) ₃ Sb	208.89		150.5	1.324 ¹⁴	
1771	C ₆ H ₁₁ ClN	Triethylamine hydrochloride	137.59	254		1.069	
1772	C ₆ H ₁₁ N ₃	Hexamethylenediamine H ₂ N(CH ₂) ₆ NH ₂	116.14	39	190		
1773	C ₆ H ₁₁ N ₄ O ₈ S	1, 1-Dimethylguanidine sulfate	270.25	288 d.			
1775	C ₇ HCl ₅ O ₂	Pentachlorobenzoic acid C ₆ Cl ₅ CO ₂ H	294.30	201			
1776	C ₇ H ₂ Br ₄ O ₂	2, 3, 4, 6-Tetrabromobenzoic acid	437.68	174			
1777	C ₇ H ₂ Cl ₄ O ₂	2, 3, 4, 5-Tetrachlorobenzoic acid	259.85	180			
1778	C ₇ H ₂ Br ₃ O ₂	2, 3, 4-Tribromobenzoic acid	358.77	198			
1779	C ₇ H ₂ Br ₃ O ₂	2, 3, 5-Tribromobenzoic acid	358.77	194			
1780	C ₇ H ₂ Br ₃ O ₂	2, 4, 5-Tribromobenzoic acid	358.77	190			
1781	C ₇ H ₂ Br ₃ O ₂	2, 4, 6-Tribromobenzoic acid	358.77	187			
1782	C ₇ H ₂ Br ₃ O ₂	3, 4, 5-Tribromobenzoic acid	358.77	235			
1783	C ₇ H ₂ Cl ₃ O ₂	2, 3, 4-Trichlorobenzoic acid	225.40	129			
1784	C ₇ H ₂ Cl ₃ O ₂	2, 3, 5-Trichlorobenzoic acid	225.40	163			
1785	C ₇ H ₂ Cl ₃ O ₂	2, 4, 5-Trichlorobenzoic acid	225.40	163			
1786	C ₇ H ₂ Cl ₃ O ₂	2, 4, 6-Trichlorobenzoic acid	225.40	160			
1787	C ₇ H ₂ Cl ₃ O ₂	3, 4, 5-Trichlorobenzoic acid	225.40	203			
1788	C ₇ H ₂ N ₃ O ₇	2, 4, 6-Trinitrobenzaldehyde	241.05	119			
1789	C ₇ H ₂ N ₃ O ₈	2, 4, 6-Trinitrobenzoic acid	257.05	190			
1790	C ₇ H ₄ BrClO	<i>o</i> -Bromobenzoyl chloride	219.41		243		
1791	C ₇ H ₄ BrClO	<i>m</i> -Bromobenzoyl chloride	219.41		230		
1792	C ₇ H ₄ BrClO	<i>p</i> -Bromobenzoyl chloride	219.41	42	247 s d		
1793	C ₇ H ₄ BrN	<i>o</i> -Bromobenzonitrile	181.96	51	253		
1794	C ₇ H ₄ BrN	<i>m</i> -Bromobenzonitrile	181.96	38	225		
1795	C ₇ H ₄ BrN	<i>p</i> -Bromobenzonitrile	181.96	113	237		
1796	C ₇ H ₄ Br ₂ O ₂	2, 3-Dibromobenzoic acid	279.86	150			
1797	C ₇ H ₄ Br ₂ O ₂	2, 4-Dibromobenzoic acid	279.86	160			
1798	C ₇ H ₄ Br ₂ O ₂	2, 5-Dibromobenzoic acid	279.86	153			
1799	C ₇ H ₄ Br ₂ O ₂	2, 6-Dibromobenzoic acid	279.86	147			
1800	C ₇ H ₄ Br ₂ O ₂	3, 4-Dibromobenzoic acid	279.86	230			
1801	C ₇ H ₄ Br ₂ O ₂	3, 5-Dibromobenzoic acid	279.86	211			
1802	C ₇ H ₄ Br ₂ O ₂	2, 6-Dibromo-3, 4, 5-trihydroxybenzoic acid	327.86	150			
1803	C ₇ H ₄ ClFO	<i>o</i> -Fluorobenzoyl chloride	158.49		206		
1804	C ₇ H ₄ ClFO	<i>m</i> -Fluorobenzoyl chloride	158.49		189		
1805	C ₇ H ₄ ClFO	<i>p</i> -Fluorobenzoyl chloride <i>p</i> -FC ₆ H ₄ COCl	158.49		193		
1806	C ₇ H ₄ ClNO ₂	<i>o</i> -Nitrobenzoyl chloride	185.50	75	205 ¹⁰⁶		
1807	C ₇ H ₄ ClNO ₂	<i>m</i> -Nitrobenzoyl chloride	185.50	34	278		
1808	C ₇ H ₄ ClNO ₂	<i>p</i> -Nitrobenzoyl chloride	185.50	72	154 ¹⁸		
1809	C ₇ H ₄ Cl ₂ O	2, 4-Dichlorobenzaldehyde	174.95	71			
1810	C ₇ H ₄ Cl ₂ O	2, 5-Dichlorobenzaldehyde	174.95	58	233	1.231 ⁷⁰	
1811	C ₇ H ₄ Cl ₂ O	3, 4-Dichlorobenzaldehyde	174.95	44	248		
1812	C ₇ H ₄ Cl ₂ O	<i>o</i> -Chlorobenzoyl chloride	174.95	-4	238		
1813	C ₇ H ₄ Cl ₂ O	<i>m</i> -Chlorobenzoyl chloride	174.95		117.5 ¹⁶		
1814	C ₇ H ₄ Cl ₂ O	<i>p</i> -Chlorobenzoyl chloride	174.95		119 ^{27,8}		
1815	C ₇ H ₄ Cl ₂ O ₂	2, 3-Dichlorobenzoic acid	190.95	160			
1816	C ₇ H ₄ Cl ₂ O ₂	2, 4-Dichlorobenzoic acid	190.95	164.2			
1817	C ₇ H ₄ Cl ₂ O ₂	2, 5-Dichlorobenzoic acid	190.95	154.4	301		
1818	C ₇ H ₄ Cl ₂ O ₂	2, 6-Dichlorobenzoic acid	190.95	143.7			
1819	C ₇ H ₄ Cl ₂ O ₂	3, 4-Dichlorobenzoic acid	190.95	204.1			
1820	C ₇ H ₄ Cl ₂ O ₂	3, 5-Dichlorobenzoic acid	190.95	188.1			
1821	C ₇ H ₄ Cl ₃ NO ₂	2, 3, 4-Trichloronitrotoluene	240.41	60			
1822	C ₇ H ₄ Cl ₄	2-Chloro-1-trichloromethylbenzene	229.80	30	260	1.51	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I No.
1823	C ₇ H ₄ FNO ₄	2-Fluoro-5-nitrobenzoic acid	185.04	139			
1824	C ₇ H ₄ FNO ₄	3-Fluoro-4-nitrobenzoic acid	185.04	122			
1825	C ₇ H ₄ FNO ₄	3-Fluoro-6-nitrobenzoic acid	185.04	134.5			
1826	C ₇ H ₄ FNO ₄	4-Fluoro-2-nitrobenzoic acid	185.04	130			
1827	C ₇ H ₄ FNO ₄	4-Fluoro-3-nitrobenzoic acid	185.04	121.5			
1828	C ₇ H ₄ I ₂ O ₄	3, 5-Diodosulicylic acid	389.90	230 d.			
1829	C ₇ H ₄ N ₂ O ₂	<i>o</i> -Nitrobenzonitrile	148.05	109			
1830	C ₇ H ₄ N ₂ O ₂	<i>m</i> -Nitrobenzonitrile	148.05	118			
1831	C ₇ H ₄ N ₂ O ₂	<i>p</i> -Nitrobenzonitrile	148.05	147			
1832	C ₇ H ₄ N ₂ O ₄	2, 4-Dinitrobenzaldehyde	196.05	72			
1833	C ₇ H ₄ N ₂ O ₄	2, 6-Dinitrobenzaldehyde	196.05	123			
1834	C ₇ H ₄ N ₂ O ₄	2, 3-Dinitrobenzoic acid	212.05	201			
1835	C ₇ H ₄ N ₂ O ₄	2, 4-Dinitrobenzoic acid	212.05	179			
1836	C ₇ H ₄ N ₂ O ₄	2, 5-Dinitrobenzoic acid	212.05	177			
1837	C ₇ H ₄ N ₂ O ₄	2, 6-Dinitrobenzoic acid	212.05	202 d.			
1838	C ₇ H ₄ N ₂ O ₄	3, 4-Dinitrobenzoic acid	212.05	163			
1839	C ₇ H ₄ N ₂ O ₄	3, 5-Dinitrobenzoic acid	212.05	205			
1840	C ₇ H ₄ N ₂ O ₇	3, 5-Dinitro-2-hydroxybenzoic acid	228.05	174			
1841	C ₇ H ₄ N ₄ O ₄	2, 3, 5, 6-Tetranitroanisole	288.06	154; 112			
1842	C ₇ H ₃ O ₈	<i>o</i> -Sulfolobenzoic anhydride	184.10	130			
1843	C ₇ H ₅ O ₇	Meconic acid	200.03		d.		1333
1844	C ₇ H ₅ BrO	Benzoyl bromide C ₆ H ₅ COBr	184.96	0	219	1.570	
1845	C ₇ H ₅ BrO ₂	<i>o</i> -Bromobenzoic acid	200.96	148			
1846	C ₇ H ₅ BrO ₂	<i>m</i> -Bromobenzoic acid	200.96	152			
1847	C ₇ H ₅ BrO ₂	<i>p</i> -Bromobenzoic acid	200.96	251			
1848	C ₇ H ₅ BrO ₂	3-Bromo-2-hydroxybenzoic acid	216.96	220			
1849	C ₇ H ₅ BrO ₂	5-Bromo-2-hydroxybenzoic acid	216.96	165			
1850	C ₇ H ₄ Br ₂	2, 3, 4-Tribromotoluene	328.79	45			
1851	C ₇ H ₄ Br ₂	2, 3, 5-Tribromotoluene	328.79	54			
1852	C ₇ H ₄ Br ₂	2, 3, 6-Tribromotoluene	328.79	59			
1853	C ₇ H ₄ Br ₂	2, 4, 5-Tribromotoluene	328.79	113			
1854	C ₇ H ₄ Br ₂	2, 4, 6-Tribromotoluene	328.79	66			
1855	C ₇ H ₄ Br ₂	3, 4, 5-Tribromotoluene	328.79	89			
1856	C ₇ H ₅ ClO	<i>o</i> -Chlorobenzaldehyde	140.50	-3	205	1.252	753
1857	C ₇ H ₅ ClO	<i>m</i> -Chlorobenzaldehyde	140.50	18	204	1.241	751
1858	C ₇ H ₅ ClO	<i>p</i> -Chlorobenzaldehyde	140.50	47.5	214	1.196 ¹¹	1092
1859	C ₇ H ₅ ClO	Benzoyl chloride C ₆ H ₅ COCl	140.50	-0.8	197.2	1.211	737
1860	C ₇ H ₅ ClO ₂	<i>o</i> -Chlorobenzoic acid	156.50	140.7			
1861	C ₇ H ₅ ClO ₂	<i>m</i> -Chlorobenzoic acid	156.50	154.9			
1862	C ₇ H ₅ ClO ₂	<i>p</i> -Chlorobenzoic acid	156.50	241.5			
1863	C ₇ H ₅ ClO ₂	Salicyl chloride <i>o</i> -HO-C ₆ H ₄ COCl	156.50	18.0	50 ¹⁰ a. d.		
1864	C ₇ H ₅ ClO ₂	5-Chloro-2-hydroxybenzoic acid	172.50	167.5			
1865	C ₇ H ₄ Cl ₂ NO ₂	<i>m</i> -Nitrobenzal chloride	205.96	05			
1866	C ₇ H ₄ Cl ₂ NO ₂ S	Halazone	270.03	213			
1868	C ₇ H ₅ Cl ₂	<i>o</i> -Chlorobenzal chloride	195.41		228.5	1.399 ¹²	
1869	C ₇ H ₅ Cl ₂	<i>p</i> -Chlorobenzal chloride	195.41		234		
1870	C ₇ H ₅ Cl ₂	Benzotrichloride C ₆ H ₅ CCl ₃	195.41	-4.8	220.7	1.378 ¹³	
1871	C ₇ H ₄ Cl ₃	2, 3, 4-Trichlorotoluene	195.41	41	234		
1872	C ₇ H ₄ Cl ₃	2, 4, 5-Trichlorotoluene	195.41	82	232		
1873	C ₇ H ₄ Cl ₃	3, 4, 5-Trichlorotoluene	195.41	42.5	247		
1874	C ₇ H ₄ Cl ₃ O	2, 4, 6-Trichloro-3-hydroxytoluene	211.41	46			
1875	C ₇ H ₄ Cl ₃ O	2, 4, 6-Trichloroanisole	211.41	60.5	240.7		
1876	C ₇ H ₅ FO	Benzoyl fluoride C ₆ H ₅ COF	124.04		162		
1877	C ₇ H ₅ FO ₂	<i>o</i> -Fluorobenzoic acid	140.04	122			
1878	C ₇ H ₅ FO ₂	<i>m</i> -Fluorobenzoic acid	140.04	124			
1879	C ₇ H ₅ FO ₂	<i>p</i> -Fluorobenzoic acid	140.04	182			
1880	C ₇ H ₅ IO	Benzoyl iodide C ₆ H ₅ COI	231.97	3	135 ¹⁴		
1881	C ₇ H ₅ IO ₂	<i>o</i> -Iodobenzoic acid	247.97	162			
1882	C ₇ H ₅ IO ₂	<i>m</i> -Iodobenzoic acid	247.97	185			
1883	C ₇ H ₅ IO ₂	<i>p</i> -Iodobenzoic acid	247.97	266			
1884	C ₇ H ₅ IO ₂	3-Iodo-2-hydroxybenzoic acid	263.97	198			
1885	C ₇ H ₄ N	Benzonitrile C ₆ H ₅ CN	103.05	-13.1	190.7	1.008 ^{15,16}	1028
1886	C ₇ H ₄ N	Phenyl isocyanide C ₆ H ₅ NC	103.05		166 d.	0.978 ¹⁶	

C-TABLE: C₇H₅ TO C₇H₇

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1887	C ₇ H ₅ NO	Anthranil.	119 05	> -18	215	1.187 ¹⁵	768
1888	C ₇ H ₅ NO	Benzoxazol	119 05	30 5	182 5		
1889	C ₇ H ₅ NO	Phenyl isocyanate C ₆ H ₅ N:CO	119 05		165 0	1 005	
1890	C ₇ H ₅ NO	Salicylic nitrile o-OHC ₆ H ₄ CN	119 05	98			
1891	C ₇ H ₅ NOS	1-Hydroxybenzothiazole	151 11	136			
1892	C ₇ H ₅ NOS	1-Mercaptobenzoxazole	151 11	193			
1893	C ₇ H ₅ NO ₂	o-Nitrobenzaldehyde	151 05	α+10.9; β37.9	156 ¹⁵		
1894	C ₇ H ₅ NO ₂	m-Nitrobenzaldehyde	151 05	58 0	164 ²²		
1895	C ₇ H ₅ NO ₂	p-Nitrobenzaldehyde	151 05	106 5			
1896	C ₇ H ₅ NO ₂ S	o-Benzoisulfimide (Saccharin)	183 11	228 d.			
1897	C ₇ H ₅ NO ₂	o-Nitrobenzoic acid	167 05	147 5		1 575 ⁴	
1898	C ₇ H ₅ NO ₂	m-Nitrobenzoic acid	167 05	141 4		1 494 ⁴	
1899	C ₇ H ₅ NO ₂	p-Nitrobenzoic acid	167 05	242 4		1 550 ²²	
1900	C ₇ H ₅ NO ₂	Quinolinic acid	167 05	190 d.			
1901	C ₇ H ₅ NO ₂	Lutidinic acid	167 05	248			
1902	C ₇ H ₅ NO ₂	Isocinchomeronic acid	167 05	237			798
1903	C ₇ H ₅ NO ₂	Dipicolinic acid	167 05	226 d.			
1904	C ₇ H ₅ NO ₂	Cinchomeronic acid	167 05	258 d.			
1905	C ₇ H ₅ NO ₂	Dinicotinic acid	167 05	323			
1906	C ₇ H ₅ NO ₂	Ammonchelidonic acid	183 05	220 d.			
1907	C ₇ H ₅ NO ₂	3-Nitro-2-hydroxybenzoic acid	183 05	144			
1908	C ₇ H ₅ NO ₂	4-Nitro-2-hydroxybenzoic acid	183 05	235			
1909	C ₇ H ₅ NO ₂	5-Nitro-2-hydroxybenzoic acid	183 05	228			
1910	C ₇ H ₅ NO ₂	6-Nitro-2-hydroxybenzoic acid	183 05	130			
1911	C ₇ H ₅ NO ₂	2-Nitro-3-hydroxybenzoic acid	183 05	178			
1912	C ₇ H ₅ NO ₂	4-Nitro-3-hydroxybenzoic acid	183 05	230			
1913	C ₇ H ₅ NO ₂	5-Nitro-3-hydroxybenzoic acid	183 05	167			
1914	C ₇ H ₅ NO ₂	6-Nitro-3-hydroxybenzoic acid	183 05	109			
1915	C ₇ H ₅ NO ₂	3-Nitro-4-hydroxybenzoic acid	183 05	185			
1916	C ₇ H ₅ NS	Benzothiazol.	135 11		230	1 248	
1917	C ₇ H ₅ NS	Phenyl thiocyanate C ₆ H ₅ CNS	135 11		232	1 155	
1918	C ₇ H ₅ NS	Phenyl isothiocyanate C ₆ H ₅ N:CS	135 11	-21	218 5	1 135 ¹⁵	
1919	C ₇ H ₅ N ₂	1, 2, 3-Benzotriazin ..	131 06	75	240		
1920	C ₇ H ₅ N ₂ O ₄	Chrysanic acid.	227 06	259			
1921	C ₇ H ₅ N ₂ O ₆	2, 3, 4-Trinitrotoluene	227 06	112	302 d.	1 620	
1922	C ₇ H ₅ N ₂ O ₆	2, 3, 5-Trinitrotoluene	227 06	97	335 d.		
1923	C ₇ H ₅ N ₂ O ₆	2, 3, 6-Trinitrotoluene	227 06	111	333 d.		
1924	C ₇ H ₅ N ₂ O ₆	2, 4, 6-Trinitrotoluene (T. N. T.)	227 06	80 7	240 exp	1 654	
1925	C ₇ H ₅ N ₂ O ₆	3, 4, 5-Trinitrotoluene ..	227 06	137 5	313 d.		
1926	C ₇ H ₅ N ₂ O ₆	3, 4, 6-Trinitrotoluene	227 06	104	291 d.	1 620	
1927	C ₇ H ₅ N ₂ O ₇	2, 3, 4-Trinitroanisol	243 06	155	exp.		
1928	C ₇ H ₅ N ₂ O ₇	2, 3, 5-Trinitroanisol	243 06	104		1 618 ¹⁵	
1929	C ₇ H ₅ N ₂ O ₇	2, 4, 6-Trinitroanisol	243 06	68.4		1 408	
1930	C ₇ H ₅ N ₂ O ₇	3, 4, 5-Trinitroanisol	243 06	120			
1931	C ₇ H ₅ N ₂ O ₇	3, 4, 6-Trinitroanisol	243 06	107			
1932	C ₇ H ₅ N ₂ O ₇	2, 4, 6-Trinitro-3-hydroxytoluene	243 06	106			
1933	C ₇ H ₅ N ₂ O ₈	2, 4, 6-Trinitrophenylmethylnitramine (Tetryl)	287 08	130	exp. 187		
1934	C ₇ H ₄ BrCl	o-Bromobenzyl chloride	205 42		115 ¹⁵		716.1
1935	C ₇ H ₄ BrCl	p-Bromobenzyl chloride	205 42	51			
1936	C ₇ H ₄ BrCl	o-Chlorobenzyl bromide	205 42		120 ¹⁶		
1937	C ₇ H ₄ BrCl	p-Chlorobenzyl bromide	205 42	48			
1938	C ₇ H ₄ BrNO	o-Bromobenzamide	199 97	156			
1939	C ₇ H ₄ BrNO	m-Bromobenzamide	199 97	150			
1940	C ₇ H ₄ BrNO	p-Bromobenzamide	199 97	190			
1941	C ₇ H ₄ BrNO ₂	o-Nitrobenzyl bromide ..	215 97	46			
1942	C ₇ H ₄ BrNO ₂	m-Nitrobenzyl bromide ..	215 97	58			
1943	C ₇ H ₄ BrNO ₂	p-Nitrobenzyl bromide ..	215 97	100			
1944	C ₇ H ₄ Br ₂	Benzal bromide C ₆ H ₄ CHBr ₂	249 88		140 ²⁰	1.51 ¹⁵	
1945	C ₇ H ₄ Br ₂	o-Bromobenzyl bromide ..	249 88	30			
1946	C ₇ H ₄ Br ₂	m-Bromobenzyl bromide ..	249 88	41			
1947	C ₇ H ₄ Br ₂	p-Bromobenzyl bromide ..	249 88	61			
1948	C ₇ H ₄ Br ₂	2, 3-Dibromotoluene	249 88	31			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1949	$C_7H_7Br_2$	2, 6-Dibromotoluene	249.88	5.5	246	1.812 ²⁸	
1950	$C_7H_7Br_2$	3, 5-Dibromotoluene	249.88	39			
1951	C_7H_7ClNO	<i>o</i> -Chlorobenzamide	155.51	141			
1952	C_7H_7ClNO	<i>m</i> -Chlorobenzamide	155.51	134.5			
1953	C_7H_7ClNO	<i>p</i> -Chlorobenzamide	155.51	178.3			
1954	$C_7H_7ClNO_2$	3-Chloro-2-nitrotoluene	171.51	23			
1955	$C_7H_7ClNO_2$	4-Chloro-2-nitrotoluene	171.51	38.2	242	1.256 ³⁰	
1956	$C_7H_7ClNO_2$	5-Chloro-2-nitrotoluene	171.51	44	250		
1957	$C_7H_7ClNO_2$	6-Chloro-2-nitrotoluene	171.51	37	238		
1958	$C_7H_7ClNO_2$	2-Chloro-3-nitrotoluene	171.51	21.5	263		
1959	$C_7H_7ClNO_2$	1-Chloro-3-nitrotoluene	171.51	7	260.5	1.297 ²⁸	
1960	$C_7H_7ClNO_2$	5-Chloro-3-nitrotoluene	171.51	61			
1961	$C_7H_7ClNO_2$	<i>o</i> -Nitrobenzyl chloride	171.51	49			1093
1962	$C_7H_7ClNO_2$	<i>m</i> -Nitrobenzyl chloride	171.51	44.5	183 ³⁸		1094
1963	$C_7H_7ClNO_2$	<i>p</i> -Nitrobenzyl chloride	171.51	71			1095
1964	$C_7H_7Cl_2$	Benzal chloride $C_6H_5CHCl_2$	160.96	-17.4	214	1.295 ¹⁸	
1965	$C_7H_7Cl_2$	<i>o</i> -Chlorobenzyl chloride	160.96		214		
1966	$C_7H_7Cl_2$	<i>p</i> -Chlorobenzyl chloride	160.96	29	214		
1967	$C_7H_7Cl_2O$	1, 1-Dichloro-2-hydroxytoluene	176.96	82			
1968	$C_7H_7Cl_2O$	3, 5-Dichloro-2-hydroxytoluene	176.96	55			
1969	$C_7H_7Cl_2O$	1, 6-Dichloro-3-hydroxytoluene	176.96	46			
1970	$C_7H_7Cl_2O_2$	4, 5-Dichloro-2-methoxyphenol	192.96	72	270		
1971	C_7H_7FNO	<i>o</i> -Fluorobenzamide	139.05	116			
1972	C_7H_7FNO	<i>m</i> -Fluorobenzamide	139.05	130			
1973	C_7H_7FNO	<i>p</i> -Fluorobenzamide	139.05	154.5			
1974	C_7H_7INO	<i>o</i> -Iodobenzamide	246.99	183.6			
1975	C_7H_7INO	<i>m</i> -Iodobenzamide	246.99	186.5			
1976	C_7H_7INO	<i>p</i> -Iodobenzamide	246.99	217.6			
1977	$C_7H_7N_2$	Benzimidazol	118.06	170	<360		1270
1978	$C_7H_7N_2$	Cyanulide $C_6H_5CNC_6H_5$	118.06	47			
1979	$C_7H_7N_2$	Indazole	118.06	146.5	270.6		
1980	$C_7H_7N_2O_2$	Ricinonic acid	150.06	298			
1981	$C_7H_7N_2O_2$	<i>o</i> -Nitrobenzamide	166.06	176.6	317	1.462 ²²	
1982	$C_7H_7N_2O_2$	<i>m</i> -Nitrobenzamide	166.06	142.7	315		
1983	$C_7H_7N_2O_2$	<i>p</i> -Nitrobenzamide	166.06	201.4			
1984	$C_7H_7N_2O_4$	2, 3-Dinitrotoluene	182.06	59.3		1.263 ¹¹¹	
1985	$C_7H_7N_2O_4$	2, 4-Dinitrotoluene	182.06	69.6	300 s. d.	1.521 ¹⁵	1297
1986	$C_7H_7N_2O_4$	2, 5-Dinitrotoluene	182.06	50.5		1.282 ¹¹¹	
1987	$C_7H_7N_2O_4$	2, 6-Dinitrotoluene	182.06	61		1.283 ¹¹¹	1300
1988	$C_7H_7N_2O_4$	3, 4-Dinitrotoluene	182.06	59.8		1.259 ¹¹¹	
1989	$C_7H_7N_2O_4$	3, 5-Dinitrotoluene	182.06	93		1.277 ¹¹¹	
1990	$C_7H_7N_2O_5$	2, 4-Dinitroanisol	198.06	95.2		1.341	
1991	$C_7H_7N_2O_5$	2, 5-Dinitroanisol	198.06	97.0	360	1.476	
1992	$C_7H_7N_2O_5$	2, 6-Dinitroanisol	198.06	117.5		1.319	
1993	$C_7H_7N_2O_5$	3, 4-Dinitroanisol	198.06	69.3		1.334 ¹¹⁰	
1994	$C_7H_7N_2O_5$	3, 5-Dinitroanisol	198.06	105.8		1.558 ¹²	
1995	$C_7H_7N_2O_5$	2, 4-Dinitro-3-hydroxytoluene	198.06	99			
1996	$C_7H_7N_2O_5$	3, 5-Dinitro-4-hydroxytoluene	198.06	85.8			
1997	$C_7H_7N_2O_6$	1, 6-Dinitro-2-methoxyphenol	214.06	123			
1998	$C_7H_7N_2O_6S$	2, 6-Dinitrotoluene-4-sulfonic acid	262.13	165			
1999	$C_7H_7N_2S$	1-Aminobenzothiazole	150.13	127			
2000	$C_7H_7N_3O_2$	2, 4, 6-Trinitro-3-aminoanisol	258.08	131			
2001	C_7H_7O	Benzaldehyde C_6H_5CHO	106.05	-56.0	179.5	1.046	725
2002	C_7H_7OS	Thiobenzoic acid C_6H_5COSH	138.11	24			
2003	$C_7H_7O_2$	Furfuralacrolein	122.05	51	200		
2004	$C_7H_7O_2$	Salicyl aldehyde $o-HOC_6H_4CHO$	122.05	-7	196.5	1.167	759
2005	$C_7H_7O_2$	<i>m</i> -Hydroxybenzaldehyde	122.05	106.0	240		
2006	$C_7H_7O_2$	<i>p</i> -Hydroxybenzaldehyde	122.05	116.0		1.129 ¹³⁰	
2007	$C_7H_7O_2$	Benzoic acid $C_6H_5CO_2H$	122.05	121.7	249.2	1.266 ¹⁸	1160, 1333
2008	$C_7H_7O_2$	Phenyl formate $HCO_2C_6H_5$	122.05		173	1.088	
2009	$C_7H_7O_4$	Toluquinone $CH_3C_6H_4O_2$	122.05	69			
2010	$C_7H_7O_4S$	Thiosalicylic acid $o-SHOC_6H_4CO_2H$	154.11	164			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2011	C ₇ H ₆ O ₂	2, 3-Dihydroxybenzaldehyde	138.05	108	235		
2012	C ₇ H ₆ O ₂	3, 4-Dihydroxybenzaldehyde	138.05	154			
2013	C ₇ H ₆ O ₂	Salicylic acid <i>o</i> -HO-C ₆ H ₄ -CO ₂ H	138.05	159	s. 76	1.443	1333
2014	C ₇ H ₆ O ₂	<i>m</i> -Hydroxybenzoic acid	138.05	201.3		1.473 ⁴	
2015	C ₇ H ₆ O ₂	<i>p</i> -Hydroxybenzoic acid	138.05	213		1.468 ⁴	
2016	C ₇ H ₆ O ₂	2, 3-Dihydroxybenzoic acid	154.05	204			
2017	C ₇ H ₆ O ₂	2, 4-Dihydroxybenzoic acid	154.05	206			
2018	C ₇ H ₆ O ₂	2, 5-Dihydroxybenzoic acid	154.05	200			
2019	C ₇ H ₆ O ₂	2, 6-Dihydroxybenzoic acid	154.05	167 d.			
2020	C ₇ H ₆ O ₂	3, 4-Dihydroxybenzoic acid	154.05	199		1.542 ⁴	
2021	C ₇ H ₆ O ₂	3, 5-Dihydroxybenzoic acid	154.05	227			
2022	C ₇ H ₆ O ₂	Pyrogallolcarboxylic acid	170.05	200 d.			
2023	C ₇ H ₆ O ₂	Gallie acid 3, 4, 5-(HO) ₃ C ₆ H ₂ CO ₂ H	170.05	220 d.	d	1.694 ⁴	1333
2024	C ₇ H ₆ O ₂ S	<i>o</i> -Sulfobenzoic acid	202.11	141			
2025	C ₇ H ₆ O ₂ S	<i>m</i> -Sulfobenzoic acid HO ₂ SC ₆ H ₄ CO ₂ H	202.11	141			
2026	C ₇ H ₆ O ₂ S	<i>p</i> -Sulfobenzoic acid HO ₂ SC ₆ H ₄ CO ₂ H	202.11	200			
2027	C ₇ H ₆ O ₂ S	Salicylsulfonic acid	218.11	120			
2028	C ₇ H ₇ AsCl ₂	Benzyl arsine dichloride	236.93		175 ⁵⁰		
2029	C ₇ H ₇ Br	Benzyl bromide	170.97	-4.0	199	1.438 ⁷²	
2030	C ₇ H ₇ Br	<i>o</i> -Bromotoluene	170.97	-28.1	181.8	1.422	738
2031	C ₇ H ₇ Br	<i>m</i> -Bromotoluene	170.97	-39.8	183.7	1.410	734
2032	C ₇ H ₇ Br	<i>p</i> -Bromotoluene	170.97	28	183.6	1.310	732
2033	C ₇ H ₇ BrO	5-Bromo-2-hydroxytoluene	186.97	64	235		
2034	C ₇ H ₇ BrO	5-Bromo-3-hydroxytoluene	186.97	62			
2035	C ₇ H ₇ BrO	3-Bromo-4-hydroxytoluene	186.97		214	1.547 ⁷⁴	
2036	C ₇ H ₇ BrO ₂	6-Bromo-2-methoxyphenol	202.97	63			
2037	C ₇ H ₇ BrO ₂	4-Bromo-2-methoxyphenol	202.97	46	182 ⁵⁰		
2038	C ₇ H ₇ Cl	Benzyl chloride	126.51	-39	179.4	1.103 ¹⁸	711
2039	C ₇ H ₇ Cl	<i>o</i> -Chlorotoluene	126.51	-35.1	159.4	1.080	601
2040	C ₇ H ₇ Cl	<i>m</i> -Chlorotoluene	126.51	-47.8	162.4	1.072	672
2041	C ₇ H ₇ Cl	<i>p</i> -Chlorotoluene	126.51	7.8	162.5	1.071 ¹⁸	606
2042	C ₇ H ₇ ClO	<i>o</i> -Chlorobenzyl alcohol	142.51	72	230		
2043	C ₇ H ₇ ClO	<i>m</i> -Chlorobenzyl alcohol	142.51		234		
2044	C ₇ H ₇ ClO	<i>p</i> -Chlorobenzyl alcohol	142.51	70.5	235		
2045	C ₇ H ₇ ClO	3-Chloro-2-hydroxytoluene	142.51	86	225		
2046	C ₇ H ₇ ClO	4-Chloro-2-hydroxytoluene	142.51	49	225		
2047	C ₇ H ₇ ClO	5-Chloro-2-hydroxytoluene	142.51	49	220		
2048	C ₇ H ₇ ClO	4-Chloro-3-hydroxytoluene	142.51	66	235		
2049	C ₇ H ₇ ClO	6-Chloro-3-hydroxytoluene	142.51	53	235		
2050	C ₇ H ₇ ClO	2-Chloro-4-hydroxytoluene	142.51		196	1.211 ²⁵	
2051	C ₇ H ₇ ClO	3-Chloro-4-hydroxytoluene	142.51	55	228		
2052	C ₇ H ₇ ClO ₂	4(5)-Chloro-2-methoxyphenol	158.51	< -18	241.5		
2053	C ₇ H ₇ ClO ₂ S	Toluene- <i>o</i> -sulfonechloride	190.58	10	126 ²¹	1.339	
2054	C ₇ H ₇ ClO ₂ S	Toluene- <i>p</i> -sulfonechloride	190.58	69	146 ¹⁸		
2055	C ₇ H ₇ ClO ₂ S	2-Chlorotoluene-5-sulfonic acid	206.58	78			
2056	C ₇ H ₇ Cl ₂ NO ₂ S	Toluene- <i>p</i> -sulfonedichloroamine	240.04	83			
2057	C ₇ H ₇ F	<i>o</i> -Fluorotoluene	110.05	< -80	114	1.001	505
2058	C ₇ H ₇ F	<i>m</i> -Fluorotoluene	110.05	-110.8	116	0.999	500
2059	C ₇ H ₇ F	<i>p</i> -Fluorotoluene	110.05		117	1.001 ¹³	502
2060	C ₇ H ₇ I	Benzyl iodide	217.99	24.1	d.	1.733 ²⁸	
2061	C ₇ H ₇ I	<i>o</i> -Iodotoluene	217.99		211	1.697	785
2062	C ₇ H ₇ I	<i>m</i> -Iodotoluene	217.99		204	1.698	
2063	C ₇ H ₇ I	<i>p</i> -Iodotoluene	217.99	35	211.5		
2064	C ₇ H ₇ IO	<i>o</i> -Iodoanisole <i>o</i> -C ₆ H ₄ (OC ₆ H ₅) ₂	233.99		240	1.800	
2065	C ₇ H ₇ IO ₂	5-Iodo-2-methoxyphenol	249.99	88			
2066	C ₇ H ₇ IO ₂	4-Iodo-2-methoxyphenol	249.99	43	180 d.	1.5	
2067	C ₇ H ₇ NO	<i>o</i> -Aminobenzaldehyde	121.06	40			
2068	C ₇ H ₇ NO	<i>m</i> -Aminobenzaldehyde	121.06	71.5			
2069	C ₇ H ₇ NO	<i>p</i> -Aminobenzaldehyde	121.06	71			
2070	C ₇ H ₇ NO	<i>syn</i> -Benzaldoxime C ₆ H ₅ C:NOH	121.06	130			
2071	C ₇ H ₇ NO	<i>anti</i> -Benzaldoxime C ₆ H ₅ C:NOH	121.06	35	153 ⁵⁵	1.111	972
2072	C ₇ H ₇ NO	Benzamide C ₆ H ₅ CONH ₂	121.06	130	290	1.341 ⁴	
2073	C ₇ H ₇ NO	Formanilide HCONHC ₆ H ₅	121.06	47.5	271	1.112 ⁶⁰	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2074	C ₇ H ₇ NO ₂	Anthranilic acid $\text{o-H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$	137.06	145			
2075	C ₇ H ₇ NO ₂	<i>m</i> -Aminobenzoic acid	137.06	174		1.511 ⁴	
2076	C ₇ H ₇ NO ₂	<i>p</i> -Aminobenzoic acid	137.06	187			
2077	C ₇ H ₇ NO ₂	Benzohydroxamic acid	137.06	125			
2078	C ₇ H ₇ NO ₂	<i>o</i> -Hydroxybenzamide	137.06	140	270 d.		
2079	C ₇ H ₇ NO ₂	<i>m</i> -Hydroxybenzamide	137.06	170.5			
2080	C ₇ H ₇ NO ₂	<i>p</i> -Hydroxybenzamide	137.06	162			
2081	C ₇ H ₇ NO ₂	<i>o</i> -Nitrotoluene	137.06	$\alpha - 10.6;$ $\beta - 4.1$	222 3	1.168 ¹⁵	724
2082	C ₇ H ₇ NO ₂	<i>m</i> -Nitrotoluene	137.06	15.5		1.164 ¹⁵	729
2083	C ₇ H ₇ NO ₂	<i>p</i> -Nitrotoluene	137.06	51.3	231	1.098 ⁶⁰	1096
2084	C ₇ H ₇ NO ₂	Phenylnitromethane	137.06		227	1.160	702
2085	C ₇ H ₇ NO ₂	<i>o</i> -Nitrobenzyl alcohol	153.06	74	168 ²⁰		
2086	C ₇ H ₇ NO ₂	<i>m</i> -Nitrobenzyl alcohol	153.06	27	180 ³		
2087	C ₇ H ₇ NO ₂	<i>p</i> -Nitrobenzyl alcohol	153.06	93	185 ¹²		
2088	C ₇ H ₇ NO ₂	3-Nitro- <i>o</i> -cresol	153.06	145			
2089	C ₇ H ₇ NO ₂	4-Nitro- <i>o</i> -cresol	153.06	94.6			
2090	C ₇ H ₇ NO ₂	5-Nitro- <i>o</i> -cresol	153.06	118			
2091	C ₇ H ₇ NO ₂	6-Nitro- <i>o</i> -cresol	153.06	69.5			
2093	C ₇ H ₇ NO ₂	4-Nitro- <i>m</i> -cresol	153.06	129			
2094	C ₇ H ₇ NO ₂	5-Nitro- <i>m</i> -cresol	153.06	91			
2095	C ₇ H ₇ NO ₂	6-Nitro- <i>m</i> -cresol	153.06	56			
2096	C ₇ H ₇ NO ₂	3-Nitro-4-hydroxytoluene	153.06	36.5	125 ²¹	1.240 ¹⁹	1053
2098	C ₇ H ₇ NO ₂	<i>o</i> -Nitroanisol	153.06	9.4	277	1.268	749
2099	C ₇ H ₇ NO ₂	<i>m</i> -Nitroanisol	153.06	38	258	1.373	
2100	C ₇ H ₇ NO ₂	<i>p</i> -Nitroanisol	153.06	54	260	1.233	
2101	C ₇ H ₇ NO ₂	4-Amino-2-hydroxybenzoic acid	153.06	220			
2102	C ₇ H ₇ NO ₂	5-Amino-2-hydroxybenzoic acid	153.06	280 d.			
2103	C ₇ H ₇ NO ₂	6-Nitro-2-methoxyphenol	169.06	62			
2104	C ₇ H ₇ NO ₂	5-Nitro-2-methoxyphenol	169.06	104			
2105	C ₇ H ₇ NO ₂	3-Nitro-2-methoxyphenol	169.06	103			
2106	C ₇ H ₇ NO ₂ S	<i>o</i> -Sulfoaminobenzoic acid	201.13	167			
2107	C ₇ H ₇ NO ₂ S	<i>m</i> -Sulfoaminobenzoic acid	201.13	238			
2108	C ₇ H ₇ NO ₂ S	<i>p</i> -Sulfoaminobenzoic acid	201.13	280 d.			
2109	C ₇ H ₇ NO ₂ S	<i>p</i> -Nitrotoluene- <i>o</i> -sulfonic acid	217.13	130			
2110	C ₇ H ₇ NS	Thiobenzamide C ₆ H ₅ CSNH ₂	137.13	116			
2111	C ₇ H ₈	Tropylidene	92.062		118	0.888	686
2112	C ₇ H ₈	Toluene	92.062	-95.1	110.5	0.866	579
2114	C ₇ H ₇ BrN	4-Bromo- <i>o</i> -toluidine	185.99	32	257 d.		
2115	C ₇ H ₇ BrN	5-Bromo- <i>o</i> -toluidine	185.99	59.5	240		
2116	C ₇ H ₇ BrN	5-Bromo- <i>m</i> -toluidine	185.99	36	260	1.144 ¹⁹	
2117	C ₇ H ₇ BrN	6-Bromo- <i>m</i> -toluidine	185.99	78.8	240		
2118	C ₇ H ₇ BrN	2-Bromo- <i>p</i> -toluidine	185.99	26	257		
2119	C ₇ H ₇ BrN	3-Bromo- <i>p</i> -toluidine	185.99	26	240	1.498	
2120	C ₇ H ₇ ClN	4-Chloro- <i>o</i> -toluidine	141.53	22	238.5		
2120 1	C ₇ H ₇ ClN	5-Chloro- <i>o</i> -toluidine	141.53	30	239.2		
2121	C ₇ H ₇ ClN	6-Chloro- <i>o</i> -toluidine	141.53		245		
2122	C ₇ H ₇ ClN	2-Chloro- <i>m</i> -toluidine	141.53		229		
2123	C ₇ H ₇ ClN	4-Chloro- <i>m</i> -toluidine	141.53	30	230		
2124	C ₇ H ₇ ClN	5-Chloro- <i>m</i> -toluidine	141.53		243		
2125	C ₇ H ₇ ClN	6-Chloro- <i>m</i> -toluidine	141.53	83	241		
2126	C ₇ H ₇ ClN	2-Chloro- <i>p</i> -toluidine	141.53	26	245		
2127	C ₇ H ₇ ClN	3-Chloro- <i>p</i> -toluidine	141.53		219	1.151	
2128	C ₇ H ₈ N ₂	Benzalhydrazine C ₆ H ₅ CH ₂ NHNH ₂	120.08	16	140 ¹¹		
2129	C ₇ H ₈ N ₂	Benzamidine C ₆ H ₅ C(NH)NH ₂	120.08	80			
2130	C ₇ H ₈ N ₂ O	<i>o</i> -Aminobenzamide	136.08	108			
2131	C ₇ H ₈ N ₂ O	<i>m</i> -Aminobenzamide	136.08	79			
2132	C ₇ H ₈ N ₂ O	<i>p</i> -Aminobenzamide NH ₂ C ₆ H ₄ CONH ₂	136.08	183			
2133	C ₇ H ₈ N ₂ O	Benzoylhydrazine C ₆ H ₅ CONHNH ₂	136.08	112			
2134	C ₇ H ₈ N ₂ O	Nitrosomethylaniline	136.08	15	225 d.	1.121 ^{12,7}	998
2135	C ₇ H ₈ N ₂ O	Phenylurea C ₆ H ₅ NHCONH ₂	136.08	147			1330
2136	C ₇ H ₈ N ₂ O ₂	<i>o</i> -Nitromethylaniline	152.08	34			
2137	C ₇ H ₈ N ₂ O ₂	<i>m</i> -Nitromethylaniline	152.08	66			

C-TABLE: C₇H₈ TO C₇H₄

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No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2138	C ₇ H ₈ N ₂ O ₂	<i>p</i> -Nitromethylaniline	152.08	152		1.201 ¹⁴⁴	
2139	C ₇ H ₈ N ₂ O ₂	3-Nitro- <i>o</i> -toluidine	152.08	96		1.190 ¹⁴⁴	
2140	C ₇ H ₈ N ₂ O ₂	4-Nitro- <i>o</i> -toluidine	152.08	105		1.365 ¹⁴	
2141	C ₇ H ₈ N ₂ O ₂	5-Nitro- <i>o</i> -toluidine	152.08	127.5		1.366 ¹⁴	
2142	C ₇ H ₈ N ₂ O ₂	6-Nitro- <i>o</i> -toluidine	152.08	91.5		1.378 ¹⁴	
2143	C ₇ H ₈ N ₂ O ₂	2-Nitro-3-aminotoluene	152.08	53			
2144	C ₇ H ₈ N ₂ O ₂	4-Nitro-3-aminotoluene	152.08	109			
2145	C ₇ H ₈ N ₂ O ₂	5-Nitro-3-aminotoluene	152.08	98.4			
2146	C ₇ H ₈ N ₂ O ₂	6-Nitro-3-aminotoluene	152.08	138			
2147	C ₇ H ₈ N ₂ O ₂	2-Nitro-4-aminotoluene	152.08	77.5			
2148	C ₇ H ₈ N ₂ O ₂	3-Nitro- <i>p</i> -toluidine	152.08	117		1.312 ¹⁷	
2149	C ₇ H ₈ N ₂ O ₂	5-Nitro-3-amino-4-hydroxytoluene	168.08	110			
2150	C ₇ H ₈ N ₂ S	Phenylthiourea C ₆ H ₅ NHCSNH ₂	152.14	154			
2151	C ₇ H ₈ N ₂ O ₂	Theophylline	180.09	272			
2152	C ₇ H ₈ N ₂ O ₂	Paraxanthine	180.09	299			
2153	C ₇ H ₈ N ₂ O ₂	Theobromine	180.09	337			
2154	C ₇ H ₈ N ₂ O ₂	1, 3-Dimethyluric acid	196.09	410 d.			
2155	C ₇ H ₈ N ₂ O ₂	1, 7-Dimethyluric acid	196.09	390 d.			
2156	C ₇ H ₈ N ₂ O ₂	1, 9-Dimethyluric acid	196.09	400 d.			
2157	C ₇ H ₈ N ₂ O ₂	3, 9-Dimethyluric acid	196.09	340 d.			
2158	C ₇ H ₈ N ₄ O ₇	Guanidine picrate	288.11	290			
2159	C ₇ H ₈ O	Benzyl alcohol C ₆ H ₅ CH ₂ OH	108.06	-15.3	205.8	1.046	713
2160	C ₇ H ₈ O	<i>o</i> -Cresol	108.06	30.1	190.8	1.051	727
2161	C ₇ H ₈ O	<i>m</i> -Cresol	108.06	10	202.8	1.035	714
2162	C ₇ H ₈ O	<i>p</i> -Cresol	108.06	34.8	201.1	1.039 ¹⁴	715
2163	C ₇ H ₈ O	Phenyl methyl ether (Anisol)	108.06	-37.3	155.8	0.994	659
2164	C ₇ H ₈ O	4, 6-Dihydrobenzaldehyde	108.06	< -20	171.5 d.	1.020 ¹⁴	
2165	C ₇ H ₈ OS	Thioguaiacol CH ₃ OC ₆ H ₄ SH	140.13		219		
2166	C ₇ H ₈ O ₂	<i>o</i> -Hydroxybenzyl alcohol	124.06	86		1.101	
2167	C ₇ H ₈ O ₂	<i>m</i> -Hydroxybenzyl alcohol	124.06	67	300 d.		
2168	C ₇ H ₈ O ₂	<i>p</i> -Hydroxybenzyl alcohol	124.06	110			
2169	C ₇ H ₈ O ₂	2, 4-Dihydroxytoluene	124.06	104			
2170	C ₇ H ₈ O ₂	2, 5-Dihydroxytoluene	124.06	125			
2171	C ₇ H ₈ O ₂	2, 6-Dihydroxytoluene	124.06	66			
2172	C ₇ H ₈ O ₂	Homocatechol 3, 4-(HO) ₂ C ₆ H ₃ CH ₃	124.06	65	252	1.129 ¹⁴	1103
2173	C ₇ H ₈ O ₂	Orcinol 3, 5-(HO) ₂ C ₆ H ₃ CH ₃	124.06	108	290	1.290 ⁴	
2174	C ₇ H ₈ O ₂	Guaiacol <i>o</i> -HOC ₆ H ₄ OCH ₃	124.06	28	205.1	1.143 ¹⁴	1179
2175	C ₇ H ₈ O ₂	Resorcinol methyl ether	124.06	< -17.5	244.3	> 1	
2176	C ₇ H ₈ O ₂	Hydroquinol methyl ether	124.06	53	243		
2176 1	C ₇ H ₈ O ₂	Dimethyl- γ -pyrone	124.06	132		0.9953 ¹²⁷	
2178	C ₇ H ₈ O ₂	Furfurylacetone	124.06	40	229		
2179	C ₇ H ₈ O ₂ S	Toluene- <i>o</i> -sulfonic acid	156.13	80			
2180	C ₇ H ₈ O ₂	2, 5-Dimethylfurfurane-3-carboxylic acid (Uvinic acid)	140.06	135			
2181	C ₇ H ₈ O ₂ S	Toluene- <i>o</i> -sulfonic acid	172.13		128.8 ²⁴		
2183	C ₇ H ₈ O ₂ S	Toluene- <i>p</i> -sulfonic acid	172.13	105	140 ¹⁰		
2184	C ₇ H ₈ O ₄	Iretol 2, 4, 6-(OH) ₃ C ₆ H ₂ OCH ₃	156.06	186			
2185	C ₇ H ₈ O ₄	Hydrochelidonic anhydride	156.06	69	210		
2186	C ₇ H ₈ O ₄ S	4-Hydroxytoluene-2-sulfonic acid	188.13	188			
2187	C ₇ H ₈ O ₄ S	2-Hydroxytoluene-6-sulfonic acid	188.13	118			
2188	C ₇ H ₈ O ₄	Cinchonic acid	188.06	169			
2189	C ₇ H ₈ S	Benzyl mercaptan C ₆ H ₅ CH ₂ SH	124.13		195	1.058 ²⁰	
2190	C ₇ H ₈ S	<i>o</i> -Thiocresol <i>o</i> -CH ₃ C ₆ H ₄ SH	124.13	15	194.3		
2191	C ₇ H ₈ S	<i>m</i> -Thiocresol <i>m</i> -CH ₃ C ₆ H ₄ SH	124.13	< -20	195.4	1.052 ¹³	
2192	C ₇ H ₈ S	<i>p</i> -Thiocresol <i>p</i> -CH ₃ C ₆ H ₄ SH	124.13	43	195		
2193	C ₇ H ₈ AsO ₄	Benzylarsonic acid C ₆ H ₅ CH ₂ AsO(OH) ₂	216.03	167			
2194	C ₇ H ₈ ClN ₂ O ₂	Theobromine hydrochloride	216.56				1333
2195	C ₇ H ₈ N	Benzylamine C ₆ H ₅ CH ₂ NH ₂	107.08		184	0.980	720
2196	C ₇ H ₈ N	2, 4-Lutidine	107.08		157	0.940 ²	
2197	C ₇ H ₈ N	2, 6-Lutidine	107.08		143	0.942 ²	
2198	C ₇ H ₈ N	3, 4-Lutidine	107.08		164.5		
2199	C ₇ H ₈ N	2-Ethylpyridine	107.08		148.8	0.950	990
2200	C ₇ H ₈ N	3-Ethylpyridine	107.08		165.3	0.959	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2201	C ₇ H ₇ N	4-Ethylpyridine	107.08		166	0.936	
2202	C ₇ H ₇ N	α -Lutidine	107.08		156.5	0.947 ^o	
2203	C ₇ H ₇ N	Methylaniline C ₆ H ₅ NHCH ₃	107.08	-57.0	195.70	0.986	757
2204	C ₇ H ₇ N	<i>o</i> -Toluidine <i>o</i> -CH ₃ C ₆ H ₄ NH ₂	107.08	α -24.4; β -16.3	200.7	0.998	758
2205	C ₇ H ₇ N	<i>m</i> -Toluidine <i>m</i> -CH ₃ C ₆ H ₄ NH ₂	107.08	-31.5	203.3	0.989	989
2206	C ₇ H ₇ N	<i>p</i> -Toluidine <i>p</i> -CH ₃ C ₆ H ₄ NH ₂	107.08	43.7	200.5	1.046	1087
2207	C ₇ H ₇ NO	<i>o</i> -Aminobenzyl alcohol	123.08	82	280 s. d.		
2208	C ₇ H ₇ NO	<i>p</i> -Aminobenzyl alcohol	123.08	95			
2209	C ₇ H ₇ NO	4-Amino-2-hydroxytoluene	123.08	161			
2210	C ₇ H ₇ NO	5-Amino-2-hydroxytoluene	123.08	175			
2211	C ₇ H ₇ NO	6-Amino-2-hydroxytoluene	123.08	128			
2212	C ₇ H ₇ NO	5-Amino- <i>m</i> -cresol	123.08	79	345		
2213	C ₇ H ₇ NO	4-Amino-3-hydroxytoluene	123.08	174			
2214	C ₇ H ₇ NO	2-Amino-4-hydroxytoluene	123.08	144.5			
2215	C ₇ H ₇ NO	3-Amino-4-hydroxytoluene	123.08	135			
2216	C ₇ H ₇ NO	<i>o</i> -Anisidine <i>o</i> -CH ₃ OC ₆ H ₄ NH ₂	123.08	5.2	224	1.108 ³⁸	
2217	C ₇ H ₇ NO	<i>m</i> -Anisidine <i>m</i> -CH ₃ OC ₆ H ₄ NH ₂	123.08		251		
2218	C ₇ H ₇ NO	<i>p</i> -Anisidine <i>p</i> -CH ₃ OC ₆ H ₄ NH ₂	123.08	57.7	245	1.071 ⁴⁸	
2219	C ₇ H ₇ NO	Benzylhydroxylamine C ₆ H ₅ CH ₂ NHOH	123.08		123 ⁵⁰		
2220	C ₇ H ₇ NO	Salicylamine <i>o</i> -OHC ₆ H ₄ CH ₂ NH ₂	123.08	129			
2221	C ₇ H ₇ NO	<i>m</i> -Tolylhydroxylamine	123.08	68			
2222	C ₇ H ₇ NO	<i>p</i> -Tolylhydroxylamine	123.08	94			
2223	C ₇ H ₇ NO	4, 6-Dihydrobenzaldoxime	123.08	44			
2224	C ₇ H ₇ NO ₂	6-Amino-2-methoxyphenol	139.08	127			
2225	C ₇ H ₇ NO ₂	Ammonium benzoate C ₆ H ₅ CO ₂ NH ₄	139.08	198		1.262 ⁴	
2226	C ₇ H ₇ NO ₂ S	Toluene- <i>o</i> -sulfoneamide	171.14	156.3			
2227	C ₇ H ₇ NO ₂ S	Toluene- <i>m</i> -sulfoneamide	171.14	108			
2228	C ₇ H ₇ NO ₂ S	Toluene- <i>p</i> -sulfoneamide	171.14	137.5			
2229	C ₇ H ₇ NO ₂	Ammonium salicylate	155.08				1333
2234. 1	C ₇ H ₇ NO ₂ S	Ammonium <i>o</i> -sulfobenzoate	219.14	> 250		1.524	1200
2235	C ₇ H ₇ N ₃ O	1-Phenylsemicarbazide	151.09	172			
2236	C ₇ H ₇ N ₃ O	4-Phenylsemicarbazide	151.09	122			
2237	C ₇ H ₁₀	2, 3-Dihydrocycloheptene	94.077		121		
2238	C ₇ H ₁₀	1, 2-Dihydrotoluene	94.077		108		
2239	C ₇ H ₁₀	1, 3-Dihydrotoluene	94.077		110.1	0.835	524
2240	C ₇ H ₁₀	2, 4-Dihydrotoluene	94.077		106	0.827	498
2241	C ₇ H ₁₀	1, 3, 5-Heptatriene	94.077		114	0.764	
2243	C ₇ H ₁₀ ClN	<i>o</i> -Toluidine hydrochloride	143.54	214.5	242		
2244	C ₇ H ₁₀ ClN	<i>m</i> -Toluidine hydrochloride	143.54	228	249.8		
2245	C ₇ H ₁₀ ClN	<i>p</i> -Toluidine hydrochloride	143.54	239	257.5		
2247	C ₇ H ₁₀ N ₂	Methyl- <i>p</i> -phenylenediamine	122.09	35.5	259.5		
2248	C ₇ H ₁₀ N ₂	Benzylhydrazine C ₆ H ₅ CH ₂ NHNH ₂	122.09	26	103 ⁴¹		
2249	C ₇ H ₁₀ N ₂	2, 3-Diammotoluene	122.09	62	255		
2250	C ₇ H ₁₀ N ₂	2, 4-Diammotoluene	122.09	99	280		
2251	C ₇ H ₁₀ N ₂	2, 5-Diammotoluene	122.09	64	274		
2252	C ₇ H ₁₀ N ₂	Toluene-2, 6-diamine	122.09	105			
2253	C ₇ H ₁₀ N ₂	3, 4-Diammotoluene	122.09	88.5	265		
2254	C ₇ H ₁₀ N ₂	3, 5-Diammotoluene	122.09		285		
2255	C ₇ H ₁₀ N ₂	1, 1-Methylphenylhydrazine	122.09		227.5	1.040	766
2256	C ₇ H ₁₀ N ₂	<i>o</i> -Tolylhydrazine <i>o</i> -CH ₃ C ₆ H ₄ NHNH ₂	122.09	56			
2257	C ₇ H ₁₀ N ₂	<i>m</i> -Tolylhydrazine	122.09		224		
2258	C ₇ H ₁₀ N ₂	<i>p</i> -Tolylhydrazine <i>p</i> -CH ₃ C ₆ H ₄ NHNH ₂	122.09	61			
2259	C ₇ H ₁₀ N ₂ O ₄	5-Ethyl-5-methylbarbituric acid	170.09	212			
2260	C ₇ H ₁₀ N ₂ O ₄	Trimethylbarbituric acid	170.09	165			
2260. 1	C ₇ H ₁₀ N ₂ O ₄	Dimethyl ureindihydroxysuccinate	234.10	203			1204
2260. 2	C ₇ H ₁₀ N ₂ O ₇	Isohydroxydimethylurea	230.11	180			1212
2261	C ₇ H ₁₀ O	1, 2, 3, 4-Tetrahydrobenzaldehyde	110.08		212	1.009 ⁹	
2262	C ₇ H ₁₀ O ₂	Δ^1 -Tetrahydrobenzoic acid	126.08			1.072 ^{47, 5}	552
2263	C ₇ H ₁₀ O ₂	Diacetylacetone CO(CH ₃ COCH ₃) ₂	142.08	49	121 ¹⁰	1.068 ⁴⁹	1090
2264	C ₇ H ₁₀ O ₄	<i>cis</i> -Pentamethylene-1, 2-dicarboxylic acid	158.08	140			
2265	C ₇ H ₁₀ O ₄	Tereonic acid	158.08	161 d.			
2266	C ₇ H ₁₀ O ₄	Terebic acid	158.08	175		0.816	

C-TABLE: C₇H₁₀ TO C₇H₁₄

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2267	C ₇ H ₁₀ O ₄	Dimethyl citraconate	158.08		210.5	1.110	922
2268	C ₇ H ₁₀ O ₄	3-Ketopimelic acid	174.08	143			
2269	C ₇ H ₁₀ O ₄	Ethyl mesoxalate (HO) ₂ C(CO ₂ C ₂ H ₅) ₂	174.08	< -31	220	1.110 ²⁵	
2270	C ₇ H ₁₀ O ₄	Quinic lactone	174.08	187			
2271	C ₇ H ₁₁ BrO ₄	Diethyl bromomalonate	239.00		235	1.426 ¹⁴	
2272	C ₇ H ₁₁ NO	Nortropinone	125.09	70			
2273	C ₇ H ₁₁ NO ₂	Arecaidine	141.09	224 d.			
2274	C ₇ H ₁₁ NO ₂	Arecaine	141.09	214 d.			
2275	C ₇ H ₁₂	<i>n</i> -Amylacetylene C ₆ H ₁₁ C≡CH	96.092	> -70	110.5	0.738 ^{14,4}	160
2276	C ₇ H ₁₂	2, 4-Dimethyl-1, 3-pentadiene	96.092		93.3	0.740 ¹⁴	815
2277	C ₇ H ₁₂	2, 4-Dimethyl-2, 3-pentadiene	96.092		70		
2278	C ₇ H ₁₂	3-Heptene C ₆ H ₅ C≡C ₂ H ₅	96.092		106	0.760 ⁹	
2279	C ₇ H ₁₂	2, 4-Heptadiene	96.092		107	0.731	806
2280	C ₇ H ₁₂	2-Heptene CH ₃ C≡CC ₄ H ₉	96.092		113.3	0.763 ⁹	
2281	C ₇ H ₁₂	4-Methylcyclohexene	96.092		102.2	0.800	385
2282	C ₇ H ₁₂	Δ ¹ -Tetrahydrotoluene	96.092		111	0.800	431
2283	C ₇ H ₁₂	Δ ² -Tetrahydrotoluene	96.092		105	0.805	408
2284	C ₇ H ₁₂	Δ ³ -Tetrahydrotoluene	96.092		103	0.790	394
2284.1	C ₇ H ₁₂ Cl ₂ O ₂	Isobutyl 1, 2-dichloropropionate	199.01			1.156 ²¹	
2285	C ₇ H ₁₂ N ₂ O	Sinapoline	140.11	100			
2286	C ₇ H ₁₂ N ₄ O	Caffeidine	168.12	94			
2287	C ₇ H ₁₂ N ₄ O ₂	Caffoline	200.12	197			
2288	C ₇ H ₁₂ O	Diallyl carbinol (CH ₂ :CHCH) ₂ CHOH	112.09		151	0.857	
2289	C ₇ H ₁₂ O	Hexahydrobenzaldehyde	112.09		161	0.926	
2289.1	C ₇ H ₁₂ O	<i>o</i> -Methylcyclohexanone	112.09		167 ²⁴⁰	0.930 ^{14,1}	842
2289.2	C ₇ H ₁₂ O	<i>m</i> -Methylcyclohexanone	112.09		60 ¹⁸	0.914 ^{14,1}	1027
2289.3	C ₇ H ₁₂ O	<i>p</i> -Methylcyclohexanone	112.09		56.4 ^{10,1}	0.912 ^{14,4}	1021
2290	C ₇ H ₁₂ O	Suberone <(CH ₂ :CH ₂ CH ₂) ₂ >CO	112.09		170.5	0.909 ⁹	
2291	C ₇ H ₁₂ O ₂	Pimelic aldehyde OCH(CH ₂) ₅ CHO	128.09		112 ¹²		
2292	C ₇ H ₁₂ O ₂	Tetraerylic acid	128.09	< -18	218		
2293	C ₇ H ₁₂ O ₂	Hexahydrobenzoic acid	128.09	31	233	1.048	1040
2294	C ₇ H ₁₂ O ₂	1, 2-Isoheptenic acid	128.09	16.5	227	0.942	442
2295	C ₇ H ₁₂ O ₂	Allyl butyrate C ₄ H ₇ CO ₂ CH ₂ CH=CH ₂	128.09		143		
2296	C ₇ H ₁₂ O ₂	Allyl isobutyrate	128.09		133.5		
2297	C ₇ H ₁₂ O ₂	Cyclohexyl formate HCO ₂ C ₆ H ₁₁	128.09	< 0	162.5	1.010 ⁹	
2298	C ₇ H ₁₂ O ₂	Ethyl angelate	128.09		142	0.918	963
2299	C ₇ H ₁₂ O ₂	Ethyl tiglate CH ₃ CH ₂ C(CH ₃)CO ₂ C ₂ H ₅	128.09		152	0.924	964
2300	C ₇ H ₁₂ O ₂	Hexahydrosalicylic acid	144.09	111			
2301	C ₇ H ₁₂ O ₂	Ethyl levulinate	144.09		205.3	1.017 ¹⁴	263
2302	C ₇ H ₁₂ O ₂	Ethyl methylacetoacetate	144.09		186.8	1.019	230
2303	C ₇ H ₁₂ O ₂	Methyl dimethylacetoacetate	144.09		174	0.999 ²⁴	
2304	C ₇ H ₁₂ O ₄	Butylmalonic acid C ₄ H ₉ CH(CO ₂ H) ₂	160.09	101.5	150 d.		
2305	C ₇ H ₁₂ O ₄	Isobutylmalonic acid	160.09	107			
2306	C ₇ H ₁₂ O ₄	<i>sec.</i> -Butylmalonic acid	160.09	70			
2307	C ₇ H ₁₂ O ₄	Diethylmalonic acid (C ₂ H ₅) ₂ C(CO ₂ H) ₂	160.09	121			
2308	C ₇ H ₁₂ O ₄	<i>n</i> -Pimelic acid HO ₂ C(CH ₂) ₅ CO ₂ H	160.09	103	272 ¹⁰⁰		
2308.1	C ₇ H ₁₂ O ₄	Trimethylsuccinic acid	160.09	152		1.242	
2309	C ₇ H ₁₂ O ₄	Diethyl malonate CH ₂ (CO ₂ C ₂ H ₅) ₂	160.09	-49.9	198.9	1.054	208
2310	C ₇ H ₁₂ O ₄	Dimethyl pyrotartrate	160.09		198	1.078	
2311	C ₇ H ₁₂ O ₄	Methyl ethyl succinate	160.09	< -20	208.2	1.093 ⁹	
2312	C ₇ H ₁₂ O ₄	Glycerol diacetate (Diacetin)	176.09		176 ⁹	1.178 ¹⁴	
2313	C ₇ H ₁₂ O ₄	Quinic acid	192.09	163	d.	1.637	1333
2314	C ₇ H ₁₂ O ₄	Diethyl mesoxalate	192.00	57	200		
2315	C ₇ H ₁₁ BrN ₂ O ₂	Adalin CH ₂ BrCONHCON(C ₂ H ₅) ₂	237.03	116			
2316	C ₇ H ₁₁ BrO ₂	Ethyl 1-bromo- <i>n</i> -valerate	209.02		192	1.226 ¹⁴	
2317	C ₇ H ₁₁ BrO ₂	Ethyl 1-bromoisovalerate	209.02		186	1.278 ¹⁴	
2318	C ₇ H ₁₁ ClO ₂	Amyl chloroacetate C ₄ H ₉ CO ₂ C ₆ H ₁₁	164.56		192	1.055	345
2319	C ₇ H ₁₁ ClO ₂	Isoamyl chloroacetate	164.56		192	1.041 ¹⁴	
2320	C ₇ H ₁₁ N	Heptylnitrile C ₆ H ₁₃ CN	111.11		183	0.815	240
2321	C ₇ H ₁₁ NO	Nortropanol	127.11	161			
2322	C ₇ H ₁₁ NO	Suberoxime (CH ₂ CH ₂ (CH ₂) ₃ C.NOH)	127.11	23	230	1.023	
2323	C ₇ H ₁₁ NO ₂	Stachydrine	143.11	210			
2324	C ₇ H ₁₁ NO ₂	Quinic amide (OH) ₄ C ₆ H ₇ CONH ₂	191.11	132			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2325	C ₇ H ₁₄	2, 4-Dimethyl-2-pentene	98.108		84	0.699 ²⁸	
2326	C ₇ H ₁₄	3-Ethyl-2-pentene (C ₂ H ₅) ₂ C:CHCH ₃	98.108		98	0.725 ¹⁴	192
2327	C ₇ H ₁₄	Heptamethylene (Cycloheptane)	98.108	-12	118.1	0.811	405
2328	C ₇ H ₁₄	Hexahydrotoluene	98.108	-147.5	103	0.764	910
2329	C ₇ H ₁₄	2-Heptene CH ₃ CH:CHC ₂ H ₅	98.108		98.5		
2330	C ₇ H ₁₄	Methylcyclohexane	98.108	-126.4	100.8	0.764	272
2331	C ₇ H ₁₄	3-Methyl-2(3)-hexene	98.108		97.4	0.718	186
2332	C ₇ H ₁₄	1-Heptene C ₂ H ₅ CH:CH ₂	98.108		99		
2333	C ₇ H ₁₄	2, 2, 3-Trimethyl-1-butene	98.108		80		
2334	C ₇ H ₁₄	2, 3-Dimethyl-2-pentene	98.108		95.1	0.719	
2335	C ₇ H ₁₄ O	Cycloheptanol	114.11		185.2	0.958	
2336	C ₇ H ₁₄ O	2-Heptene-4-ol	114.11		63 ¹¹	0.842 ^{14, 4}	838
2337	C ₇ H ₁₄ O	Hexahydrobenzyl alcohol	114.11		181.2	0.916	816
2338	C ₇ H ₁₄ O	1-Methylcyclohexane-1-ol	114.11	26	168.3	0.919 ²⁸	1029
2339	C ₇ H ₁₄ O	<i>o</i> -Hexahydrocresol	114.11		169	0.923	478
2340	C ₇ H ₁₄ O	<i>m</i> -Hexahydrocresol	114.11	-47	176	0.914	466
2341	C ₇ H ₁₄ O	<i>dl</i> - <i>m</i> -Hexahydrocresol	114.11		175	0.923	467
2342	C ₇ H ₁₄ O	<i>p</i> -Hexahydrocresol	114.11		174	0.924 ¹⁴	833
2343	C ₇ H ₁₄ O	Heptaldehyde C ₆ H ₁₃ CHO	114.11	-45.0	155	0.850	202
2344	C ₇ H ₁₄ O	Dipropyl ketone (C ₃ H ₇) ₂ CO	114.11	-32.6	143.5	0.821 ¹⁴	173
2345	C ₇ H ₁₄ O	Diisopropyl ketone [(CH ₃) ₂ CH] ₂ CO	114.11		123.7	0.806	
2346	C ₇ H ₁₄ O	Ethyl <i>n</i> -butyl ketone C ₂ H ₅ COC ₄ H ₉	114.11		148.5		
2347	C ₇ H ₁₄ O	Ethyl isobutyl ketone	114.11		136	0.815	
2348	C ₇ H ₁₄ O	Methyl <i>n</i> -amyl ketone CH ₃ COC ₅ H ₁₁	114.11		150	0.822 ¹⁴	
2349	C ₇ H ₁₄ O	Methyl isomyl ketone	114.11		144	0.821 ¹⁷	
2350	C ₇ H ₁₄ O ₂	Isomylacetic acid	130.11		216.5	0.926 ¹⁴	
2351	C ₇ H ₁₄ O ₂	Heptylic acid C ₆ H ₁₃ CO ₂ H	130.11	-10	223.5	0.922	269
2353	C ₇ H ₁₄ O ₂	<i>n</i> -Amyl acetate CH ₃ CO ₂ C ₆ H ₁₁	130.11		147.6	0.879 ²⁰	130
2354	C ₇ H ₁₄ O ₂	Isoamyl acetate	130.11		142.5	0.875	122
2354.1	C ₇ H ₁₄ O ₂	<i>d</i> - β -Amyl acetate	130.11		131	0.868	100
2355	C ₇ H ₁₄ O ₂	<i>tert</i> -Amyl acetate	130.11		124.8	0.874 ¹⁹	
2356	C ₇ H ₁₄ O ₂	Ethyl <i>n</i> -valerate C ₆ H ₁₃ CO ₂ C ₂ H ₅	130.11		145.5	0.877	1109
2357	C ₇ H ₁₄ O ₂	Ethyl isovalerate	130.11	-99.3	135	0.866	126
2358	C ₇ H ₁₄ O ₂	<i>n</i> -Hexyl formate HCO ₂ C ₆ H ₁₃	130.11		153.6	0.898 ⁹	
2359	C ₇ H ₁₄ O ₂	Isobutyl propionate	130.11	-71.4	138	0.869	108
2359.1	C ₇ H ₁₄ O ₂	<i>d</i> - <i>sec</i> -Butyl propionate	130.11		132	0.8657	
2360	C ₇ H ₁₄ O ₂	Methyl <i>n</i> -caproate C ₆ H ₁₃ CO ₂ CH ₃	130.11		149.5	0.904 ⁹	
2361	C ₇ H ₁₄ O ₂	Propyl <i>n</i> -butyrate C ₄ H ₉ CO ₂ C ₃ H ₇	130.11	-95.2	143	0.879 ¹⁵	123
2362	C ₇ H ₁₄ O ₂	Propyl isobutyrate (CH ₃) ₂ CHCO ₂ C ₃ H ₇	130.11		135.4	0.884 ⁹	97
2363	C ₇ H ₁₄ O ₂	Isopropyl butyrate C ₄ H ₉ CO ₂ CH(CH ₃) ₂	130.11		128	0.865 ¹³	
2364	C ₇ H ₁₄ O ₂	Isopropyl isobutyrate	130.11		120.8	0.869 ⁹	
2365	C ₇ H ₁₄ O ₃	Di- <i>n</i> -propyl carbonate CO(OC ₃ H ₇) ₂	146.11		168.2	0.908 ²²	
2366	C ₇ H ₁₄ O ₃	Ethyl butyl carbonate	146.11		169		
2367	C ₇ H ₁₄ O ₄	Glycerol 1-butyrate	162.11		271		
2367.1	C ₇ H ₁₄ O ₄	<i>l</i> -Methyl rhamnoside	178.11	109			1227
2368	C ₇ H ₁₄ O ₄	α -Methyl galactoside	194.11	112			
2369	C ₇ H ₁₄ O ₄	β -Methyl galactoside	194.11	176			
2370	C ₇ H ₁₄ O ₄	α -Methyl glucose	194.11	161			
2371	C ₇ H ₁₄ O ₄	β -Methyl glucose	194.11	135			
2372	C ₇ H ₁₄ O ₄	α -Methyl glucoside	194.11	168	200 ⁹		1230
2373	C ₇ H ₁₄ O ₄	β -Methyl glucoside	194.11	104			1171
2373.1	C ₇ H ₁₄ O ₄	α -Methyl mannoside	194.11	194			1217
2374	C ₇ H ₁₄ O ₄	<i>d</i> -Inositol methyl ether (β -Pinitol)	194.11	187		1.52	
2375	C ₇ H ₁₄ O ₄	<i>l</i> -Inositol methyl ether (Quebrachitol)	194.11	191	210 ^{vac}	1.54	
2376	C ₇ H ₁₄ O ₇	<i>d</i> , β -Galactose	210.11	199			
2377	C ₇ H ₁₄ O ₇	<i>d</i> , α -Glucose	210.11	215 d.			
2378	C ₇ H ₁₄ O ₈	<i>d</i> -Mannoheptonic acid	226.11	175 d.			
2379	C ₇ H ₁₄ S	<i>m</i> -Hexahydrothiophenol	130.17		174		
2380	C ₇ H ₁₅ Br	<i>n</i> -Heptyl bromide C ₇ H ₁₅ Br	179.03		178.8	1.133 ¹⁶	
2381	C ₇ H ₁₅ Cl	<i>n</i> -Heptyl chloride C ₇ H ₁₅ Cl	134.57		159.5	0.881 ¹⁶	
2382	C ₇ H ₁₅ F	<i>n</i> -Heptyl fluoride C ₇ H ₁₅ F	118.12	-73	119.2	0.804	61
2383	C ₇ H ₁₅ I	<i>n</i> -Heptyl iodide C ₇ H ₁₅ I	226.05		203.8	1.401 ⁹	469
2384	C ₇ H ₁₅ N	Ethylpiperidine	113.12		128	0.857 ²⁸	1000

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2385	C ₇ H ₁₅ NO	<i>n</i> -Heptylamide C ₇ H ₁₅ CONH ₂	129.12	96			
2386	C ₇ H ₁₅ NO	Heptaldoxime C ₇ H ₁₅ CH:NOH	129.12	55.5	195	0.834 ¹¹	1124
2386 1	C ₇ H ₁₅ NO ₂	Isobutylurethane C ₄ H ₉ NHCO ₂ C ₃ H ₇	145.12	< -65	96 ¹⁷	0.943	311
2387	C ₇ H ₁₅	2, 4-Dimethylpentane CH ₃ (CH(CH ₃)) ₂ CH ₃	100.12		83.9	0.681	45
2388	C ₇ H ₁₅	3, 3-Dimethylpentane	100.12		87	0.711 ⁶	
2389	C ₇ H ₁₅	<i>n</i> -Heptane CH ₃ (CH ₂) ₅ CH ₃	100.12	-90.0	98.4	0.684	55
2390	C ₇ H ₁₅	2-Methylhexane (CH ₃) ₂ CHC ₄ H ₉	100.12		90.4	0.707 ²	
2391	C ₇ H ₁₅	<i>d</i> , 3-Methylhexane C ₃ H ₇ CH(CH ₃)C ₃ H ₇	100.12		92	0.687	
2392	C ₇ H ₁₅	3-Ethylpentane (C ₂ H ₅) ₂ CH	100.12		93.8	0.670	89
2393	C ₇ H ₁₅	2, 2, 3-Trimethylbutane	100.12	-25	80.8	0.695 ¹⁰	77
2394	C ₇ H ₁₅	2, 2-Dimethylpentane (CH ₃) ₂ CC ₄ H ₉	100.12		78.6	0.674	
2396	C ₇ H ₁₅ O	Dimethylbutyl carbinol	116.12		142.2	0.816	224
2397	C ₇ H ₁₅ O	Dimethylisobutyl carbinol	116.12		130	0.816	228
2398	C ₇ H ₁₅ O	Dimethyl- <i>tert</i> .-butyl carbinol	116.12	17	132		
2399	C ₇ H ₁₅ O	Dipropyl carbinol (C ₃ H ₇) ₂ CHOH	116.12		155.1	0.820	256
2400	C ₇ H ₁₅ O	Diisopropyl carbinol	116.12		140	0.820	265
2400 1	C ₇ H ₁₅ O	<i>d</i> -Ethylbutyl carbinol	116.12		60 ¹⁸	0.823	251
2401	C ₇ H ₁₅ O	Ethylisobutyl carbinol	116.12		148.2		
2402	C ₇ H ₁₅ O	Ethyl- <i>sec</i> .-butyl carbinol	116.12		150	0.852 ⁹	
2403	C ₇ H ₁₅ O	<i>n</i> -Heptyl alcohol C ₇ H ₁₅ OH	116.12	-34.6	175.8	0.817 ¹¹	287
2404	C ₇ H ₁₅ O	2-Hydroxy-3-ethylpentane	116.12		152	0.853 ⁹	
2405	C ₇ H ₁₅ O	1-Hydroxy-2-methylhexane	116.12		162.5	0.831 ¹³	266
2406	C ₇ H ₁₅ O	Isoheptyl alcohol	116.12		167.2	0.831 ¹⁰	291
2407	C ₇ H ₁₅ O	Methyl- <i>n</i> -amyl carbinol	116.12		158	0.819	259
2407 1	C ₇ H ₁₅ O	<i>d</i> -Methylamyl carbinol	116.12		73.5 ²⁰	0.819	253
2408	C ₇ H ₁₅ O	Methylisoamyl carbinol	116.12		150	0.819 ¹⁷	
2409	C ₇ H ₁₅ O	Methylethylpropyl carbinol	116.12		141	0.823	270
2410	C ₇ H ₁₅ O	Methylethylisopropyl carbinol	116.12		140	0.833	
2411	C ₇ H ₁₅ O	Propylisopropyl carbinol	116.12		141	0.821 ¹⁷	215
2412	C ₇ H ₁₅ O	Triethyl carbinol (C ₂ H ₅) ₃ COH	116.12		142	0.840	334
2413	C ₇ H ₁₅ O	Ethyl isoamyl ether	116.12		112	0.764 ¹⁸	
2414	C ₇ H ₁₅ O	Propyl butyl ether C ₃ H ₇ OC ₄ H ₉	116.12		117.1	0.777 ⁹	
2415	C ₇ H ₁₅ O ₂	Ethyl orthoformate HC(OC ₂ H ₅) ₂	148.12	-76.1	145.9	0.807	
2416	C ₇ H ₁₅ O ₂ S	Sulfonal (CH ₃) ₂ C(SO ₂ C ₂ H ₅) ₂	228.25	128	300 d.		
2417	C ₇ H ₁₅ O ₇	<i>d</i> -Mannoheptitol	212.12	188			
2418	C ₇ H ₁₅ O ₇	Volomitol	212.12	155			
2419	C ₇ H ₁₇ N	<i>n</i> -Heptylamine C ₇ H ₁₅ NH ₂	115.14	-23.0	155.1	0.777	278
2420	C ₈ Cl ₄ O ₂	Tetrachloro- <i>o</i> -phthalic anhydride	285.83	257			
2421	C ₈ H ₂ Cl ₂ O ₄	3, 6-Dichloro- <i>o</i> -phthalic anhydride	216.93	191	339		
2422	C ₈ H ₂ Cl ₄ O ₄	Tetrachloro- <i>o</i> -phthalic acid	303.85	250			
2422 1	C ₈ H ₃ BrNO ₂	<i>m</i> -Bromoisatine	225.96	255			
2422 2	C ₈ H ₇ ClNO	Isatine chloride	165.50	180 d.			
2423	C ₈ H ₄ Cl ₂ O ₂	<i>o</i> -Phthalyl dichloride <i>o</i> -C ₆ H ₄ (COCl) ₂	202.95	0	276.7	1.408	755
2424	C ₈ H ₄ Cl ₂ O ₂	Isophthalyl dichloride <i>m</i> -C ₆ H ₄ (COCl) ₂	202.95	41	276		
2425	C ₈ H ₄ Cl ₂ O ₂	Terephthalyl dichloride <i>p</i> -C ₆ H ₄ (COCl) ₂	202.95	78	250		
2426	C ₈ H ₄ Cl ₂ O ₄	3, 6-Dichloro- <i>o</i> -phthalic acid	234.95	185			
2427	C ₈ H ₅ Cl ₃ O	Trichloromethyl <i>p</i> -chlorophenylketone	257.86	28	181 ¹⁹		
2428	C ₈ H ₄ N ₂	Isophthalic nitrile <i>m</i> -C ₆ H ₄ (CN) ₂	128.05	161			
2429	C ₈ H ₄ N ₂	Terephthalic nitrile <i>p</i> -C ₆ H ₄ (CN) ₂	128.05	222			
2430	C ₈ H ₄ N ₂ O ₄	Nitroisatine	192.05	230			
2431	C ₈ H ₄ O ₃	<i>o</i> -Phthalic anhydride	148.03	130.8	284.5	1.527 ⁴	
2432	C ₈ H ₅ Cl ₃ O	Dichloromethyl <i>p</i> -chlorophenyl ketone	223.41	51	178 ¹⁹		
2433	C ₈ H ₄ Cl ₄ NO	2, 3, 4, 6-Tetrachloroacetanilide	272.88	181			
2434	C ₈ H ₅ NO	Benzoyl cyanide C ₆ H ₅ COCN	131.05	34	208		
2435	C ₈ H ₅ NO ₂	<i>o</i> -Cyanobenzoic acid	147.05	190			
2436	C ₈ H ₅ NO ₂	<i>m</i> -Cyanobenzoic acid	147.05	217			
2437	C ₈ H ₅ NO ₂	<i>p</i> -Cyanobenzoic acid	147.05	214			
2438	C ₈ H ₅ NO ₂	Isatine	147.05	201			
2439	C ₈ H ₅ NO ₂	<i>o</i> -Phthalimide <i>o</i> -C ₆ H ₄ (CO) ₂ NH	147.05	238			
2440	C ₈ H ₅ NO ₃	3-Nitro- <i>o</i> -phthalic acid	211.05	220			
2441	C ₈ H ₅ NO ₃	4-Nitro- <i>o</i> -phthalic acid	211.05	164			
2442	C ₈ H ₅ NO ₃	2-Nitroisophthalic acid	211.05	300			
2443	C ₈ H ₅ NO ₃	4-Nitroisophthalic acid	211.05	245			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2444	C ₈ H ₆ NO ₄	5-Nitroisophthalic acid	211.05	255			
2445	C ₈ H ₆ NO ₄	2-Nitroterephthalic acid	211.05	270			
2446	C ₈ H ₆ NO ₄	Pyridine-2, 3, 4-tricarboxylic acid	211.05	250 d.			
2447	C ₈ H ₆ NO ₄	Pyridine-2, 3, 5-tricarboxylic acid	211.05	323			
2448	C ₈ H ₆ NO ₄	Pyridine-2, 3, 6-tricarboxylic acid	211.05	100			
2449	C ₈ H ₆ NO ₄	Pyridine-2, 4, 5-tricarboxylic acid	211.05	235			
2450	C ₈ H ₆ NO ₄	Pyridine-2, 4, 6-tricarboxylic acid	211.05	227			
2451	C ₈ H ₆ NO ₄	Pyridine-3, 4, 5-tricarboxylic acid	211.05	261			
2452	C ₈ H ₈ N ₂ O ₄	Pieryl acetate	271.06	76	120 d.		
2453	C ₈ H ₈	Phenylacetylene C ₈ H ₈ C≡CH	102.05		143	0.930	820
2454	C ₈ H ₈ BrN	Bromobenzyl cyanide C ₈ H ₈ CHBrCN	195.97	> -17	231.7	1.519	1185
2455	C ₈ H ₈ Br ₂	Styrene-1, 2-dibromide	261.88	73.5	134 ¹⁸		
2456	C ₈ H ₈ Br ₂ O	<i>p</i> -Bromophenacyl bromide	277.88	109.7			
2457	C ₈ H ₈ Cl ₂ O ₂	Piperonal chloride	204.96		240 s. d.		
2458	C ₈ H ₈ Cl ₂ NO	2, 3, 4-Trichloroacetanilide	238.43	122			
2459	C ₈ H ₈ Cl ₂ NO	2, 4, 5-Trichloroacetanilide	238.43	190			
2460	C ₈ H ₈ Cl ₂ NO	2, 4, 6-Trichloroacetanilide	238.43	204			
2461	C ₈ H ₈ I ₂ O ₂	Methyl 3, 5-diiodosalicylate	403.91	110.5			
2462	C ₈ H ₈ N ₂	Phthalazine	130.06	91	317		
2463	C ₈ H ₈ N ₂	Quinazoline	130.06	48	243		
2464	C ₈ H ₈ N ₂	Quinoxaline	130.06	30.5	226	1.133 ¹⁸	1075
2465	C ₈ H ₈ N ₂ O ₂	Isatoxime (Nitrosooxindol)	162.06	202			
2466	C ₈ H ₈ N ₂ O ₂	<i>p</i> -Nitrobenzyl cyanide	162.06	117			
2467	C ₈ H ₈ N ₂ O ₂	Alloxantin	286.08	170 d.			
2468	C ₈ H ₈ O	Commarone	118.05	> -18	175	1.091	997
2469	C ₈ H ₈ O ₂	Phenylglyoxal C ₈ H ₈ CO·CHO	131.05	73	142 ^{12a}		
2470	C ₈ H ₈ O ₂	<i>o</i> -Phthalic aldehyde <i>o</i> -C ₈ H ₈ (CHO) ₂	134.05	56			
2471	C ₈ H ₈ O ₂	Isophthalic aldehyde <i>m</i> -C ₈ H ₈ (CHO) ₂	134.05	89.5			
2472	C ₈ H ₈ O ₂	Terephthalic aldehyde <i>p</i> -C ₈ H ₈ (CHO) ₂	134.05	116	248		
2473	C ₈ H ₈ O ₂	Phthalide	134.05	73; 65	290		
2474	C ₈ H ₈ O ₂	Piperonal (Heliotropin)	150.05	37	263		
2475	C ₈ H ₈ O ₂	<i>o</i> -Aldehydobenzene acid	150.05	100.5		1.404	
2476	C ₈ H ₈ O ₂	<i>m</i> -Aldehydobenzene acid	150.05	175			
2477	C ₈ H ₈ O ₂	<i>p</i> -Aldehydobenzene acid	150.05	250			
2478	C ₈ H ₈ O ₂	Phenylglyoxylic acid	150.05	66	148 ⁸		
2479	C ₈ H ₈ O ₄	<i>o</i> -Phthalic acid <i>o</i> -C ₈ H ₈ (CO ₂ H) ₂	166.05	191 d.		1.593	
2480	C ₈ H ₈ O ₄	Isophthalic acid <i>m</i> -C ₈ H ₈ (CO ₂ H) ₂	166.05	330			
2482	C ₈ H ₈ O ₄	Piperonylic acid C ₈ H ₈ O ₂ :C ₈ H ₈ CO ₂ H	166.05	228			
2483	C ₈ H ₈ O ₄	2-Hydroxy- <i>o</i> -phthalic acid	182.05	244			
2485	C ₈ H ₈ O ₄	4-Hydroxy- <i>o</i> -phthalic acid	182.05	181 d.			
2486	C ₈ H ₈ O ₄	2-Hydroxyisophthalic acid	182.05	239			
2487	C ₈ H ₈ O ₄	4-Hydroxyisophthalic acid	182.05	306			
2488	C ₈ H ₈ O ₄	5-Hydroxyisophthalic acid	182.05	288			
2489	C ₈ H ₈ O ₄	Noropionic acid	182.05	171			
2490	C ₈ H ₈ S	Thionaphthene	134.11	32	221	1.165	1049
2491	C ₈ H ₇ Br	<i>α</i> -Bromostyrene C ₈ H ₇ Br:CH ₂	182.97	-43.5	160 ^{7a}	1.4057	770
2492	C ₈ H ₇ Br	<i>ω</i> -Bromostyrene (isomer 1)	182.97	7	221	1.4224	786
2493	C ₈ H ₇ Br	<i>ω</i> -Bromostyrene (isomer 2)	182.97	-7.5	108 ^{2a}	1.427	992
2493 1	C ₈ H ₇ BrN ₂ O ₂	<i>α</i> -Bromonitroacetanilide	258.99	131		1.765	
2494	C ₈ H ₇ BrO	<i>ω</i> -Bromoacetophenone	198.97	50	119	1.647	
2495	C ₈ H ₇ Cl	<i>α</i> -Chlorostyrene C ₈ H ₇ Cl:CH ₂	138.51		199		
2496	C ₈ H ₇ Cl	<i>ω</i> -Chlorostyrene C ₈ H ₇ Cl:CHCl	138.51		198.8	1.112 ^{2a}	
2497	C ₈ H ₇ ClO	<i>ω</i> -Chloroacetophenone	154.51	59	247	1.324 ¹⁸	
2498	C ₈ H ₇ ClO	<i>p</i> -Chloroacetophenone	154.51	20	232	1.188	
2499	C ₈ H ₇ ClO	Phenylacetyl chloride C ₈ H ₇ CH ₂ COCl	154.51		102.5 ¹⁷	1.168	
2500	C ₈ H ₇ ClO ₂	<i>p</i> -Anisyl chloride <i>p</i> -CH ₃ OC ₆ H ₄ COCl	170.51	27			
2501	C ₈ H ₇ ClO ₂	Phenyl chloroacetate ClCH ₂ CO ₂ C ₆ H ₅	170.51	45	235		
2502	C ₈ H ₇ F ₂ NO	2, 5-Difluoroacetanilide	171.06	122.5			
2503	C ₈ H ₇ N	Benzyl cyanide C ₈ H ₇ CH ₂ CN	117.06	-23.8	233.9	1.015 ¹⁸	679
2504	C ₈ H ₇ N	Indole	117.06	52.5	254		1333
2505	C ₈ H ₇ N	<i>o</i> -Tolunitrile <i>o</i> -CH ₃ C ₆ H ₄ CN	117.06		204	0.995 ¹⁸	1004
2506	C ₈ H ₇ N	<i>m</i> -Tolunitrile <i>m</i> -CH ₃ C ₆ H ₄ CN	117.06		214	0.984 ¹⁸	
2507	C ₈ H ₇ N	<i>p</i> -Tolunitrile <i>p</i> -CH ₃ C ₆ H ₄ CN	117.06	29.5	217		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2508	C ₈ H ₇ NO	<i>p</i> -Anisonitrile <i>p</i> -CH ₃ OC ₆ H ₄ CN	133.06	60	256		
2509	C ₈ H ₇ NO	<i>dl</i> -Mandelonitrile C ₆ H ₅ CH(OH)CN	133.06	-10	d.	1.124	
2510	C ₈ H ₇ NO	Indoxyl.....	133.06	85	110		
2511	C ₈ H ₇ NO	Oxindol.....	133.06	120			
2512	C ₈ H ₇ NO ₂	Hydrindic acid (Dioxindol)	149.06	180	195 d.		
2513	C ₈ H ₇ NO ₂	<i>o</i> -Nitrostyrene <i>o</i> -NO ₂ C ₆ H ₄ CH=CH ₂	119.06	13.5			
2514	C ₈ H ₇ NO ₂	<i>m</i> -Nitrostyrene <i>m</i> -NO ₂ C ₆ H ₄ CH=CH ₂	119.06	-5			
2515	C ₈ H ₇ NO ₂	<i>p</i> -Nitrostyrene <i>p</i> -NO ₂ C ₆ H ₄ CH=CH ₂	119.06	29			
2516	C ₈ H ₇ NO ₂	Oxanilic acid CO ₂ H.CONHC ₆ H ₅	165.06	150			
2517	C ₈ H ₇ NO ₂	<i>o</i> -Phthalamic acid	165.06	149	155 d.		
2518	C ₈ H ₇ NO ₂	Methyl <i>o</i> -nitrobenzoate	181.06	-8	269	1.284 ¹¹	
2519	C ₈ H ₇ NO ₂	Methyl <i>m</i> -nitrobenzoate	181.06	70	270		
2520	C ₈ H ₇ NO ₂	Methyl <i>p</i> -nitrobenzoate	181.06	96			
2521	C ₈ H ₇ NO ₂	Uvitonic acid	181.06	274			
2522	C ₈ H ₇ NS	Benzyl isothiocyanate	149.13		243		
2522 1	C ₈ H ₇ NS	Benzyl thiocyanate	149.13	41	235		
2523	C ₈ H ₇ NS	<i>o</i> -Tolyl isothiocyanate	149.13		239	1.104 ¹²	
2524	C ₈ H ₇ NS	<i>m</i> -Tolyl isothiocyanate	149.13		215		
2525	C ₈ H ₇ NS	<i>p</i> -Tolyl isothiocyanate	149.13	26	237	1.087 ¹²	
2526	C ₈ H ₇ N ₂ O ₄	2, 3-Dinitroacetanilide	225.08	186			
2527	C ₈ H ₇ N ₂ O ₄	2, 4-Dinitroacetanilide	225.08	120			
2528	C ₈ H ₇ N ₂ O ₄	2, 6-Dinitroacetanilide	225.08	197			
2529	C ₈ H ₇ N ₂ O ₄	3, 4-Dinitroacetanilide	225.08	144			
2530	C ₈ H ₇ N ₂ O ₄	3, 6-Dinitroacetanilide	225.08	121			
2531	C ₈ H ₇ N ₂ O ₄	3, 4, 5-Trinitro- <i>o</i> -xylene	241.08	115			
2532	C ₈ H ₇ N ₂ O ₄	3, 4, 6-Trinitro- <i>o</i> -xylene	241.08	72			
2533	C ₈ H ₇ N ₂ O ₄	2, 4, 5-Trinitro- <i>m</i> -xylene	241.08	90			
2534	C ₈ H ₇ N ₂ O ₄	2, 4, 6-Trinitro- <i>m</i> -xylene	241.08	181.5			
2535	C ₈ H ₇ N ₂ O ₄	4, 5, 6-Trinitro- <i>m</i> -xylene	241.08	125			
2536	C ₈ H ₇ N ₂ O ₄	2, 3, 6-Trinitro- <i>p</i> -xylene	241.08	140 ¹⁰			
2537	C ₈ H ₇ N ₂ O ₇	Ethyl picrate	257.08	78.5			
2538	C ₈ H ₈	Styrene (Phenylethylene)	104.06		140	0.903	907
2539	C ₈ H ₈ BrNO	<i>o</i> -Bromoacetanilide	213.99	99			
2540	C ₈ H ₈ BrNO	<i>p</i> -Bromoacetanilide	213.99	165			
2540 1	C ₈ H ₈ Br ₂	<i>o</i> -Xylenedibromide <i>o</i> -C ₆ H ₄ (CH ₂ Br) ₂	263.89	94.5	d.	1.988	
2540 2	C ₈ H ₈ Br ₂	<i>m</i> -Xylenedibromide <i>m</i> -C ₆ H ₄ (CH ₂ Br) ₂	263.89	77	140	1.959	
2541	C ₈ H ₈ Br ₂	<i>p</i> -Xylenedibromide <i>p</i> -C ₆ H ₄ (CH ₂ Br) ₂	263.89	144	245	2.102 ¹⁰	
2542	C ₈ H ₈ ClNO	<i>o</i> -Chloroacetanilide.....	169.53	88			
2543	C ₈ H ₈ ClNO	<i>m</i> -Chloroacetanilide	169.53	72.5			
2544	C ₈ H ₈ ClNO	<i>p</i> -Chloroacetanilide	169.53	172.5			
2544.1	C ₈ H ₈ Cl ₂	<i>o</i> -Xylenedichloride <i>o</i> -C ₆ H ₄ (CH ₂ Cl) ₂	174.98	55	241	1.393	
2544.2	C ₈ H ₈ Cl ₂	<i>m</i> -Xylenedichloride <i>m</i> -C ₆ H ₄ (CH ₂ Cl) ₂	174.98	34.2	255	1.302	
2545	C ₈ H ₈ Cl ₂	<i>p</i> -Xylenedichloride <i>p</i> -C ₆ H ₄ (CH ₂ Cl) ₂	174.98	100.5	120 ¹⁰	1.417 ¹⁰	
2546	C ₈ H ₈ INO	<i>p</i> -Iodoacetanilide <i>p</i> -CH ₃ CONHC ₆ H ₄ I	261.00	184			
2547	C ₈ H ₈ N ₂	Apoharmine.....	132.08	183			
2548	C ₈ H ₈ N ₂	1-Methylindazole.....	132.08		107 ¹⁵	1.032 ^{15, 1}	1129
2549	C ₈ H ₈ N ₂ OS	Benzoylthiourea C ₆ H ₅ CONHCSNH ₂	180.14	169			
2550	C ₈ H ₈ N ₂ O ₂	Benzoylurea C ₆ H ₅ CONHCONH ₂	164.08	200			
2551	C ₈ H ₈ N ₂ O ₂	<i>o</i> -Phthalic diamide <i>o</i> -C ₆ H ₄ (CONH ₂) ₂	164.08	220			
2552	C ₈ H ₈ N ₂ O ₂	Isophthalic diamide <i>m</i> -C ₆ H ₄ (CONH ₂) ₂	164.08	265			
2553	C ₈ H ₈ N ₂ O ₂	<i>N</i> -Nitrosoacetanilide	164.08	41			
2554	C ₈ H ₈ N ₂ O ₂	Ricinine	164.08	201			
2555	C ₈ H ₈ N ₂ O ₂	<i>o</i> -Nitroacetanilide...	180.08	93			
2556	C ₈ H ₈ N ₂ O ₂	<i>m</i> -Nitroacetanilide...	180.08	150.5			
2557	C ₈ H ₈ N ₂ O ₂	<i>p</i> -Nitroacetanilide	180.08	214			
2558	C ₈ H ₈ N ₂ O ₄	3, 4-Dinitro- <i>o</i> -xylene	196.08	82			
2559	C ₈ H ₈ N ₂ O ₄	3, 6-Dinitro- <i>o</i> -xylene	196.08	50			
2560	C ₈ H ₈ N ₂ O ₄	4, 5-Dinitro- <i>o</i> -xylene	196.08	115			
2561	C ₈ H ₈ N ₂ O ₄	4, 6-Dinitro- <i>o</i> -xylene	196.08	75			
2562	C ₈ H ₈ N ₂ O ₄	2, 5-Dinitro- <i>m</i> -xylene	196.08	101			
2563	C ₈ H ₈ N ₂ O ₄	4, 5-Dinitro- <i>m</i> -xylene	196.08	132			
2564	C ₈ H ₈ N ₂ O ₄	2, 3-Dinitro- <i>p</i> -xylene	196.08	93			
2565	C ₈ H ₈ N ₂ O ₄	2, 5-Dinitro- <i>p</i> -xylene	196.08	147			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2566	C ₈ H ₈ N ₂ O ₄	2, 6-Dinitro- <i>p</i> -xylene	196.08	124			
2566 1	C ₈ H ₈ N ₂ O ₄	4, 5-Dinitro-1, 2-dimethoxybenzene	228.08	130.5		1.326 ¹²¹	
2566 2	C ₈ H ₈ N ₂ O	4-Methoxyphenyltetrazole	128.09	228			1306
2567	C ₈ H ₈ O	Phenylacetaldehyde C ₆ H ₅ CH ₂ CHO	120.06		194	1.027	
2568	C ₈ H ₈ O	<i>o</i> -Toluic aldehyde <i>o</i> -CH ₃ C ₆ H ₄ CHO	120.06		195.5	1.039	960
2569	C ₈ H ₈ O	<i>m</i> -Toluic aldehyde <i>m</i> -CH ₃ C ₆ H ₄ CHO	120.06		195.5	1.019	971
2570	C ₈ H ₈ O	<i>p</i> -Toluic aldehyde <i>p</i> -CH ₃ C ₆ H ₄ CHO	120.06		204	1.020	814; 906 705
2571	C ₈ H ₈ O	Acetophenone CH ₃ COC ₆ H ₅	120.06	19.7	202.3	1.026	
2572	C ₈ H ₈ O	Coumarane	120.06		180.5	1.074	
2573	C ₈ H ₈ O ₂	Phenacyl alcohol C ₆ H ₅ COCH ₂ OH	136.06	86		1.013	
2574	C ₈ H ₈ O ₂	5-Hydroxytoluene-2-aldehyde	136.06	108.9			
2575	C ₈ H ₈ O ₂	4-Hydroxytoluene-3-aldehyde	136.06	55.1	21.8		
2576	C ₈ H ₈ O ₂	6-Hydroxytoluene-3-aldehyde	136.06	117.4			
2577	C ₈ H ₈ O ₂	3-Hydroxytoluene-4-aldehyde	136.06	54	223		
2578	C ₈ H ₈ O ₂	<i>o</i> -Methoxybenzaldehyde	136.06	35	242	1.133	745
2579	C ₈ H ₈ O ₂	<i>m</i> -Methoxybenzaldehyde	136.06		230	1.118	836
2580	C ₈ H ₈ O ₂	<i>p</i> -Methoxybenzaldehyde	136.06	2.5	247	1.123	821
2581	C ₈ H ₈ O ₂	<i>o</i> -Hydroxyacetophenone	136.06		213		
2582	C ₈ H ₈ O ₂	<i>m</i> -Hydroxyacetophenone	136.06	95			
2583	C ₈ H ₈ O ₂	<i>p</i> -Hydroxyacetophenone	136.06	109			
2584	C ₈ H ₈ O ₂	Phenylacetic acid C ₆ H ₅ CH ₂ CO ₂ H	136.06	76.7	265.5	1.078 ⁸³	
2585	C ₈ H ₈ O ₂	<i>o</i> -Toluic acid <i>o</i> -CH ₃ C ₆ H ₄ CO ₂ H	136.06	102.4	259.2	1.062 ¹¹⁴ 6	1157
2586	C ₈ H ₈ O ₂	<i>m</i> -Toluic acid <i>m</i> -CH ₃ C ₆ H ₄ CO ₂ H	136.06	110.5	263	1.054 ¹¹¹ 6	640
2587	C ₈ H ₈ O ₂	<i>p</i> -Toluic acid <i>p</i> -CH ₃ C ₆ H ₄ CO ₂ H	136.06	176.8	275		
2588	C ₈ H ₈ O ₂	Benzyl formate HCO ₂ C ₆ H ₅	136.06		203.4	1.081	
2589	C ₈ H ₈ O ₂	Methyl benzoate C ₆ H ₅ CO ₂ CH ₃	136.06	-12.5	199.6	1.094	656
2590	C ₈ H ₈ O ₂	Phenyl acetate CH ₃ CO ₂ C ₆ H ₅	136.06		195.5	1.078	610
2591	C ₈ H ₈ O ₂	<i>o</i> -Xyloquinone 1, 2-(CH ₃) ₂ C ₆ H ₂ O ₂ -3, 6.	136.06	55			
2592	C ₈ H ₈ O ₂	<i>m</i> -Xyloquinone 1, 3-(CH ₃) ₂ C ₆ H ₂ O ₂ -2, 5.	136.06	73			
2593	C ₈ H ₈ O ₂	<i>p</i> -Xyloquinone 1, 4-(CH ₃) ₂ C ₆ H ₂ O ₂ -2, 5.	136.06	125			
2594	C ₈ H ₈ O ₂	Piperonyl alcohol	152.06	51			
2595	C ₈ H ₈ O ₂	Isovanillin 4, 3-CH ₃ OC ₆ H ₃ (OH)CHO	152.06	116		1.196	
2596	C ₈ H ₈ O ₂	Vanillin 3, 4-CH ₃ OC ₆ H ₃ (OH)CHO	152.06	81	285		
2597	C ₈ H ₈ O ₂	<i>o</i> -Hydroxymethylbenzoic acid	152.06	120			
2598	C ₈ H ₈ O ₂	<i>m</i> -Hydroxymethylbenzoic acid	152.06	111	190 ¹¹		
2599	C ₈ H ₈ O ₂	<i>p</i> -Hydroxymethylbenzoic acid	152.06	181			
2600	C ₈ H ₈ O ₂	<i>o</i> -Hydroxyphenylacetic acid	152.06	137			
2601	C ₈ H ₈ O ₂	<i>m</i> -Hydroxyphenylacetic acid	152.06	129			
2602	C ₈ H ₈ O ₂	<i>p</i> -Hydroxyphenylacetic acid	152.06	148			
2603	C ₈ H ₈ O ₂	3-Hydroxytoluene-2-carboxylic acid	152.06	167			
2604	C ₈ H ₈ O ₂	4-Hydroxytoluene-2-carboxylic acid	152.06	172.4			
2605	C ₈ H ₈ O ₂	5-Hydroxytoluene-2-carboxylic acid	152.06	178			
2606	C ₈ H ₈ O ₂	6-Hydroxytoluene-2-carboxylic acid	152.06	183			
2607	C ₈ H ₈ O ₂	4-Hydroxytoluene-3-carboxylic acid	152.06	152.5			
2608	C ₈ H ₈ O ₂	5-Hydroxytoluene-3-carboxylic acid	152.06	208			
2609	C ₈ H ₈ O ₂	6-Hydroxytoluene-3-carboxylic acid	152.06	172			
2610	C ₈ H ₈ O ₂	2-Hydroxytoluene-4-carboxylic acid	152.06	207			
2611	C ₈ H ₈ O ₂	3-Hydroxytoluene-4-carboxylic acid	152.06	177.8			
2612	C ₈ H ₈ O ₂	<i>d</i> (<i>l</i>)-Mandelic acid C ₆ H ₅ CH(OH)CO ₂ H	152.06	133			
2613	C ₈ H ₈ O ₂	<i>dl</i> -Mandelic acid C ₆ H ₅ CH(OH)CO ₂ H	152.06	118		1.361 ⁴	
2614	C ₈ H ₈ O ₂	<i>o</i> -Methoxybenzoic acid	152.06	98	200		
2615	C ₈ H ₈ O ₂	<i>m</i> -Methoxybenzoic acid	152.06	100			
2616	C ₈ H ₈ O ₂	<i>p</i> -Methoxybenzoic acid	152.06	184.2	280	1.385 ⁴	1333
2617	C ₈ H ₈ O ₂	Phenoxyacetic acid C ₆ H ₅ OC ₆ H ₄ CO ₂ H	152.06	99	285 s. d.		
2618	C ₈ H ₈ O ₂	Methyl salicylate HOC ₆ H ₄ CO ₂ CH ₃	152.06	-8.6	223.3	1.184	708
2619	C ₈ H ₈ O ₂	Resorcinol acetate	152.06		283		
2620	C ₈ H ₈ O ₂	Phloracetophenone	168.06	285			
2621	C ₈ H ₈ O ₂	Berberonic acid 2, 4, 5-C ₆ H ₃ N(CO ₂ H) ₃	168.06	165			
2622	C ₈ H ₈ O ₂	Dehydracetic acid	168.06	109	270		
2623	C ₈ H ₈ O ₂	Δ ⁴ -Dihydro- <i>o</i> -phthalic acid	168.06	153			
2624	C ₈ H ₈ O ₂	Δ ³ -Dihydro- <i>o</i> -phthalic acid	168.06	215			
2625	C ₈ H ₈ O ₂	Δ ³ -Dihydro- <i>o</i> -phthalic acid	168.06	215			

C-TABLE: C₆H₆ TO C₆H₁₀

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2626	C ₆ H ₈ O ₄	Homogentisinic acid	168.06	147			
2627	C ₆ H ₈ O ₄	Isovanillic acid	168.06	250			
2628	C ₆ H ₈ O ₄	Vanillic acid	168.06	207			
2630	C ₆ H ₈ O ₄	Methyl gallate	184.06	192 d.			
2631	C ₆ H ₈ O ₄	Tetramethylene-1, 1, 2, 2-tetracarboxylic acid	232.06	203			
2632	C ₆ H ₅ Br	<i>o</i> -Xylyl bromide	184.99	21	217.7	1.381 ¹³	740
2633	C ₆ H ₅ Br	4-Bromo- <i>o</i> -xylene	184.99	0.2	214.5	1.369	
2634	C ₆ H ₅ Br	<i>m</i> -Xylyl bromide	184.99		215.8 s. d.	1.371 ¹³	
2635	C ₆ H ₅ Br	2-Bromo- <i>m</i> -xylene	184.99	> -10	206		
2636	C ₆ H ₅ Br	4-Bromo- <i>m</i> -xylene	184.99		207		
2637	C ₆ H ₅ Br	5-Bromo- <i>m</i> -xylene	184.99	> -20	204	1.362	
2638	C ₆ H ₅ Br	<i>p</i> -Xylyl bromide	184.99	38	220.7	1.324	
2639	C ₆ H ₅ Br	2-Bromo- <i>p</i> -xylene	184.99	10	205.7	1.350	735
2640	C ₆ H ₅ Cl	<i>o</i> -Xylyl chloride	140.53		190		
2641	C ₆ H ₅ Cl	3-Chloro- <i>o</i> -xylene	140.53	> -20	189.5		
2642	C ₆ H ₅ Cl	4-Chloro- <i>o</i> -xylene	140.53	> -20	191.5	1.0092 ¹⁴	
2643	C ₆ H ₅ Cl	<i>m</i> -Xylyl chloride	140.53		196		
2644	C ₆ H ₅ Cl	<i>p</i> -Xylyl chloride	140.53		202		
2645	C ₆ H ₅ N	2-Allylpyridine	119.08		190	0.959 ⁹	
2646	C ₆ H ₅ NO	<i>o</i> -Aminoacetophenone	135.08		252 s. d.		
2647	C ₆ H ₅ NO	<i>m</i> -Aminoacetophenone	135.08	96.5	200		
2648	C ₆ H ₅ NO	<i>p</i> -Aminoacetophenone	135.08	106	205		
2649	C ₆ H ₅ NO	Acetanilide (Antifebrin)	135.08	114.2	303.8	1.21 ⁴	
2650	C ₆ H ₅ NO	Acetophenoneoxime CH ₃ C(=NOH)C ₆ H ₅	135.08	58			
2651	C ₆ H ₅ NO	Phenylacetamide C ₆ H ₅ CH ₂ CONH ₂	135.08	155	284		
2652	C ₆ H ₅ NO	<i>o</i> -Toluic amide <i>o</i> -CH ₃ C ₆ H ₄ CONH ₂	135.08	138			
2653	C ₆ H ₅ NO	<i>m</i> -Toluic amide <i>m</i> -CH ₃ C ₆ H ₄ CONH ₂	135.08	97			
2654	C ₆ H ₅ NO	<i>p</i> -Toluic amide <i>p</i> -CH ₃ C ₆ H ₄ CONH ₂	135.08	159			
2655	C ₆ H ₅ NO ₂	<i>o</i> -Acetoaminophenol	151.08	203			
2656	C ₆ H ₅ NO ₂	<i>m</i> -Acetoaminophenol	151.08	149			
2657	C ₆ H ₅ NO ₂	<i>p</i> -Acetoaminophenol	151.08	168			
2658	C ₆ H ₅ NO ₂	<i>dl</i> -Aminophenylacetic acid	151.08	256	265		
2659	C ₆ H ₅ NO ₂	Homoanthranilic acid	151.08	177 d.			
2660	C ₆ H ₅ NO ₂	<i>N</i> -Methylantranilic acid	151.08	170			
2661	C ₆ H ₅ NO ₂	<i>dl</i> -Phenylaminoacetic acid	151.08	127			
2662	C ₆ H ₅ NO ₂	Benzyl carbamate C ₆ H ₅ CH ₂ CO ₂ NH ₂	151.08	80			
2663	C ₆ H ₅ NO ₂	Ethyl nicotinate	151.08		105 ⁵		
2664	C ₆ H ₅ NO ₂	Methyl <i>o</i> -aminobenzoate	151.08	8.2; 24.3	135.5 ¹⁵	1.168 ¹⁵	
2665	C ₆ H ₅ NO ₂	Methyl <i>p</i> -aminobenzoate	151.08	112			
2666	C ₆ H ₅ NO ₂	3-Nitro- <i>o</i> -xylene	151.08		250.8	1.147 ¹⁶	
2667	C ₆ H ₅ NO ₂	4-Nitro- <i>o</i> -xylene	151.08	30	258	1.139 ²⁰	
2668	C ₆ H ₅ NO ₂	2-Nitro- <i>m</i> -xylene	151.08		225.5	1.112 ¹⁶	
2669	C ₆ H ₅ NO ₂	4-Nitro- <i>m</i> -xylene	151.08	2	246	1.126 ^{17,4}	
2670	C ₆ H ₅ NO ₂	5-Nitro- <i>m</i> -xylene	151.08	71	273.7		
2671	C ₆ H ₅ NO ₂	2-Nitro- <i>p</i> -xylene	151.08		239.9	1.132 ¹⁸	
2672	C ₆ H ₅ NO ₂	α -Anisaldoxime CH ₃ OC ₆ H ₄ CH=NOH	151.08	64			
2673	C ₆ H ₅ NO ₂	β -Anisaldoxime CH ₃ OC ₆ H ₄ CH=NOH	151.08	133			
2674	C ₆ H ₅ NO ₂	<i>o</i> -Methoxybenzamide	151.08	129			
2675	C ₆ H ₅ NO ₂	<i>p</i> -Methoxybenzamide	151.08	162.3			
2676	C ₆ H ₅ NO ₂	3-Nitro-4-methoxytoluene	167.08	8.5	274 d.		
2677	C ₆ H ₅ NO ₂	<i>o</i> -Nitrophenetol <i>o</i> -C ₂ H ₄ OC ₆ H ₄ NO ₂	167.08		268	1.190 ¹⁹	718
2678	C ₆ H ₅ NO ₂	<i>p</i> -Nitrophenetol <i>p</i> -C ₂ H ₄ OC ₆ H ₄ NO ₂	167.08	60	283		
2679	C ₆ H ₅ NO ₂	Methyl 3-hydroxy-4-aminobenzoate	167.08	120			
2680	C ₆ H ₅ NO ₂	Methyl 3-amino-4-hydroxybenzoate	167.08	143			
2681	C ₆ H ₅ NO ₄	Biliverdic acid	183.08	114			
2682	C ₆ H ₅ NS	Thioacetanilide CH ₃ C(=NH)C ₆ H ₅	151.14	75	d.		
2682.1	C ₆ H ₅ N ₂ O ₄	2, 4-Dinitrodimethylaniline	221.09	87		1.476	
2683	C ₆ H ₁₀	Ethylbenzene C ₆ H ₅ CH ₂ CH ₃	106.08	-92.8	136.5 ^{7,6,7}	0.868	577
2684	C ₆ H ₁₀	<i>o</i> -Xylene <i>o</i> -C ₆ H ₄ (CH ₃) ₂	106.08	-27.1	144	0.879	626
2685	C ₆ H ₁₀	<i>m</i> -Xylene <i>m</i> -C ₆ H ₄ (CH ₃) ₂	106.08	-53.6	139.0	0.865	584
2686	C ₆ H ₁₀	<i>p</i> -Xylene <i>p</i> -C ₆ H ₄ (CH ₃) ₂	106.08	13.2	137.7	0.861	573
2687	C ₆ H ₁₀ ClN	<i>o</i> -Chlorodimethylaniline	155.54		208.5	1.107	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2688	C ₈ H ₁₀ ClN	<i>p</i> -Chlorodimethylaniline	155.54	35.5	231		
2689	C ₈ H ₁₀ N ₂ O	<i>N</i> -Acetyl- <i>o</i> -phenylenediamine	150.09	144.8			
2690	C ₈ H ₁₀ N ₂ O	<i>N</i> -Acetyl- <i>m</i> -phenylenediamine	150.09	279			
2691	C ₈ H ₁₀ N ₂ O	<i>N</i> -Acetyl- <i>p</i> -phenylenediamine	150.09	160.5			
2692	C ₈ H ₁₀ N ₂ O	Benzylurea C ₆ H ₅ CH ₂ NHCONH ₂	150.09	147.5			
2693	C ₈ H ₁₀ N ₂ O	Hydracine CH ₃ COHN.NHC ₆ H ₅	150.09	128			
2694	C ₈ H ₁₀ N ₂ O	1-Methyl-1-phenylurea	150.09	82			
2695	C ₈ H ₁₀ N ₂ O	<i>p</i> -Nitrosodimethylaniline	150.09	85			
2696	C ₈ H ₁₀ N ₂ O ₂	<i>o</i> -Nitrodimethylaniline	166.09		154 ²⁴	1.179	
2697	C ₈ H ₁₀ N ₂ O ₂	<i>m</i> -Nitrodimethylaniline	166.09	66	285	1.313 ¹⁷	
2698	C ₈ H ₁₀ N ₂ O ₂	<i>p</i> -Nitrodimethylaniline	166.09	163			
2699	C ₈ H ₁₀ N ₂ O ₂	3-Amino-4-methoxy-6-nitrotoluene	182.09	131.5			
2700	C ₈ H ₁₀ N ₂ S	Benzylthiourea C ₆ H ₅ CH ₂ NHCSNH ₂	166.16	162			
2701	C ₈ H ₁₀ N ₂ O ₂	Caffeine (Theine)	194.11	237		1.23	
2702	C ₈ H ₁₀ N ₄ O ₄	1, 3, 9-Trimethyluric acid	210.11	320 d.			
2703	C ₈ H ₁₀ N ₄ O ₄	1, 7, 9-Trimethyluric acid	210.11	340			
2704	C ₈ H ₁₀ N ₄ O ₄	2, 7, 9-Trimethyluric acid	210.11	380			
2705	C ₈ H ₁₀ O	2, 3-Dimethylphenol	122.08	75	218		
2706	C ₈ H ₁₀ O	2, 4-Dimethylphenol	122.08	26	211.5	1.036	
2707	C ₈ H ₁₀ O	2, 6-Dimethylphenol	122.08	49	212		
2708	C ₈ H ₁₀ O	3, 4-Dimethylphenol	122.08	65	225.1		
2709	C ₈ H ₁₀ O	3, 5-Dimethylphenol	122.08	68	219.5		
2710	C ₈ H ₁₀ O	<i>o</i> -Ethylphenol	122.08	> -18	207.5	1.037 ⁰	
2711	C ₈ H ₁₀ O	<i>m</i> -Ethylphenol	122.08	-4	214	1.025 ⁰	
2712	C ₈ H ₁₀ O	<i>p</i> -Ethylphenol	122.08	46	219		
2713	C ₈ H ₁₀ O	Methylphenyl carbinol	122.08		205	1.003 ²⁵	
2713.1	C ₈ H ₁₀ O	<i>d</i> -Methylphenyl carbinol	122.08		100 ¹⁸	1.014	668
2714	C ₈ H ₁₀ O	2-Phenylethyl alcohol C ₆ H ₅ CH ₂ CH ₂ OH	122.08		221	1.024 ¹⁵	677
2715	C ₈ H ₁₀ O	<i>o</i> -Tolyl carbinol <i>o</i> -CH ₃ C ₆ H ₄ CH ₂ OH	122.08	34	223.3	1.023 ¹⁰	
2716	C ₈ H ₁₀ O	<i>m</i> -Tolyl carbinol <i>m</i> -CH ₃ C ₆ H ₄ CH ₂ OH	122.08	> -20	217	1.036 ⁰	
2717	C ₈ H ₁₀ O	<i>p</i> -Tolyl carbinol <i>p</i> -CH ₃ C ₆ H ₄ CH ₂ OH	122.08	59.5	217		
2718	C ₈ H ₁₀ O	Benzyl methyl ether C ₆ H ₅ CH ₂ OCH ₃	122.08		174	0.987 ²⁰	
2719	C ₈ H ₁₀ O	<i>o</i> -Cresyl methyl ether <i>o</i> -CH ₃ C ₆ H ₄ OCH ₃	122.08		171.3	0.981	619
2720	C ₈ H ₁₀ O	<i>m</i> -Cresyl methyl ether	122.08		177.2	0.978 ¹⁹	627
2721	C ₈ H ₁₀ O	<i>p</i> -Cresyl methyl ether	122.08		176.5	0.970	646
2722	C ₈ H ₁₀ O	Phenetol C ₆ H ₅ OC ₂ H ₅	122.08	-30.2	172	0.965	633
2723	C ₈ H ₁₀ O ₂	Anis alcohol <i>p</i> -CH ₃ OC ₆ H ₄ CH ₂ OH	138.08	45	258.8	1.109 ²⁸	
2724	C ₈ H ₁₀ O ₂	Caffeol	138.08		197		
2725	C ₈ H ₁₀ O ₂	Cresol 3, 4-(CH ₃ O)(OH)C ₆ H ₃ CH ₃	138.08	5.5	221.8	1.092	709
2726	C ₈ H ₁₀ O ₂	3, 5-Dimethyl- <i>o</i> -dihydroxybenzene	138.08	74			
2727	C ₈ H ₁₀ O ₂	4, 5-Dimethyl- <i>o</i> -dihydroxybenzene	138.08	82			
2728	C ₈ H ₁₀ O ₂	2, 4-Dimethylresorcinol	138.08	150			
2729	C ₈ H ₁₀ O ₂	2, 5-Dimethylresorcinol	138.08	163	280		
2730	C ₈ H ₁₀ O ₂	4, 5-Dimethylresorcinol	138.08	137			
2731	C ₈ H ₁₀ O ₂	4, 6-Dimethylresorcinol	138.08	125	279		
2732	C ₈ H ₁₀ O ₂	2, 3-Dimethylhydroquinone	138.08	221 s. d.			
2733	C ₈ H ₁₀ O ₂	2, 5-Dimethylhydroquinone	138.08	213			
2734	C ₈ H ₁₀ O ₂	2, 6-Dimethylhydroquinone	138.08	151			
2735	C ₈ H ₁₀ O ₂	<i>p</i> -Homosaligenin	138.08	105			
2736	C ₈ H ₁₀ O ₂	Styrolene alcohol HOCH ₂ CH ₂ OC ₆ H ₅	138.08	68	274.2		
2737	C ₈ H ₁₀ O ₂	<i>o</i> -Dimethoxybenzene <i>o</i> -C ₆ H ₄ (OCH ₃) ₂	138.08	22.5	206	1.086 ¹⁸	
2738	C ₈ H ₁₀ O ₂	<i>o</i> -Ethoxyphenol <i>o</i> -HOC ₆ H ₄ OC ₂ H ₅	138.08	28	241		
2739	C ₈ H ₁₀ O ₂	Hydroquinone dimethyl ether	138.08	56	212.6	1.053 ²¹	
2740	C ₈ H ₁₀ O ₂	Hydroquinone monoethyl ether	138.08	66	247		
2741	C ₈ H ₁₀ O ₂	Resorcinol dimethyl ether	138.08	-55.3	215	1.080 ⁰	
2742	C ₈ H ₁₀ O ₂	Resorcinol monoethyl ether	138.08		247		
2743	C ₈ H ₁₀ O ₂ S	Ethylphenylsulfone C ₆ H ₅ SO ₂ C ₂ H ₅	170.14	42	>300	1.010 ²²	
2744	C ₈ H ₁₀ O ₂	3-Methoxy-4-hydroxybenzyl alcohol	154.08	115	d.		
2745	C ₈ H ₁₀ O ₂	Crotonic anhydride	154.08		247.8	1.040	520
2746	C ₈ H ₁₀ O ₄	Δ ¹ -Tetrahydro- <i>o</i> -phthalic acid	170.08	120			
2747	C ₈ H ₁₀ O ₄	Δ ¹ -Tetrahydro- <i>o</i> -phthalic acid	170.08	215			
2748	C ₈ H ₁₀ O ₄	Diallyl oxalate C ₃ O ₄ (C ₃ H ₅) ₂	170.08		217	1.055	
2749	C ₈ H ₁₀ O ₄	Dimethyl muconate (CH ₃ :CH.CO ₂ CH ₃) ₂	170.08	75 u.; 156 st.			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2750	C ₈ H ₁₀ O ₂	Succinic peroxide	234.08	127 d.			
2751	C ₈ H ₁₁ BrN ₂ O ₂	Caffeine hydrobromide	275.03				1333
2752	C ₈ H ₁₁ ClN ₂ O	<i>p</i> -Nitrosodimethylaniline hydrochloride	186.56	177			
2753	C ₈ H ₁₁ ClN ₂ O ₂	Caffeine hydrochloride	230.58				1338
2753.1	C ₈ H ₁₁ ClO ₄	Ethyl chloromaleate	206.54		125.5 ¹¹	1.191 ¹¹	
2754	C ₈ H ₁₁ Cl ₂ O ₆	α -Chloralose	309.46	230			
2755	C ₈ H ₁₁ I ₃ N ₂ O ₂	Caffeine triiodide	575.91	171			
2756	C ₈ H ₁₁ N	Dimethylaniline C ₆ H ₅ N(CH ₃) ₂	121.09	1.67	193.50	0.950	771
2757	C ₈ H ₁₁ N	2, 3-Dimethylaniline	121.09	> -15	223.8	0.992	756
2758	C ₈ H ₁₁ N	2, 4-Dimethylaniline	121.09		216	0.974	744
2759	C ₈ H ₁₁ N	2, 5-Dimethylaniline	121.09	15.5	217	0.980 ¹¹	908
2760	C ₈ H ₁₁ N	2, 6-Dimethylaniline	121.09		216.9	0.979	748
2761	C ₈ H ₁₁ N	3, 4-Dimethylaniline	121.09	40	226	1.076	
2762	C ₈ H ₁₁ N	3, 5-Dimethylaniline	121.09		221	0.972	742
2763	C ₈ H ₁₁ N	<i>N</i> -Ethylaniline C ₆ H ₅ NH.C ₂ H ₅	121.09	-63.5	204.72	0.963	739
2764	C ₈ H ₁₁ N	<i>o</i> -Ethylaniline <i>o</i> -C ₂ H ₅ C ₆ H ₄ NH ₂	121.09		216	0.983 ¹¹	
2765	C ₈ H ₁₁ N	<i>m</i> -Ethylaniline <i>m</i> -C ₂ H ₅ C ₆ H ₄ NH ₂	121.09		215	0.990 ⁹	
2766	C ₈ H ₁₁ N	<i>p</i> -Ethylaniline <i>p</i> -C ₂ H ₅ C ₆ H ₄ NH ₂	121.09	-5	216.5	0.975 ¹¹	
2767	C ₈ H ₁₁ N	Methyl- <i>o</i> -toluidine CH ₃ C ₆ H ₄ NH ₂	121.09		207	0.977	750
2768	C ₈ H ₁₁ N	Methyl- <i>m</i> -toluidine	121.09		206		
2769	C ₈ H ₁₁ N	Methyl- <i>p</i> -toluidine <i>p</i> -CH ₃ C ₆ H ₄ NHCH ₃	121.09		206		
2770	C ₈ H ₁₁ N	α -Phenylethylamine C ₆ H ₅ CH(NH ₂)CH ₃	121.09		187.4	0.940 ¹¹	
2771	C ₈ H ₁₁ N	ω -Phenylethylamine C ₆ H ₅ CH ₂ CH ₂ NH ₂	121.09		198.2	0.958 ¹¹	761
2772	C ₈ H ₁₁ N	2-Isopropylpyridine	121.09		159	0.934 ⁹	
2773	C ₈ H ₁₁ N	4-Isopropylpyridine	121.09		178	0.944 ⁹	
2774	C ₈ H ₁₁ N	2-Methyl-5-ethylpyridine	121.09		174	0.918 ¹¹	
2775	C ₈ H ₁₁ N	Nicotine	121.09		208	0.955	643
2776	C ₈ H ₁₁ N	2-Propylpyridine (Conyrrine)	121.09		165		
2777	C ₈ H ₁₁ N	2, 3, 4-Trimethylpyridine	121.09		188	0.913	
2778	C ₈ H ₁₁ N	2, 4, 5-Trimethylpyridine	121.09		168	0.906	
2779	C ₈ H ₁₁ N	2, 4, 6-Trinethylpyridine	121.09		172	0.917 ¹⁰	
2780	C ₈ H ₁₁ NO	Hydroxyethylaniline	137.09		286	1.110 ⁹	
2781	C ₈ H ₁₁ NO	<i>o</i> -Dimethylaminophenol	137.09	45	200		
2782	C ₈ H ₁₁ NO	<i>o</i> -Ethylaminophenol <i>o</i> -HOC ₆ H ₄ NH.C ₂ H ₅	139.09	107.5			
2783	C ₈ H ₁₁ NO	<i>m</i> -Ethylaminophenol	137.09	62	176 ¹¹		
2784	C ₈ H ₁₁ NO	3-Amino-2-methoxytoluene	137.09		223		
2785	C ₈ H ₁₁ NO	5-Amino-2-methoxytoluene	137.09	53			
2786	C ₈ H ₁₁ NO	<i>o</i> -Phenetidine <i>o</i> -NH ₂ C ₆ H ₄ OC ₂ H ₅	137.09	> -21	229.2		
2787	C ₈ H ₁₁ NO	<i>m</i> -Phenetidine <i>m</i> -NH ₂ C ₆ H ₄ OC ₂ H ₅	137.09		248		
2788	C ₈ H ₁₁ NO	<i>p</i> -Phenetidine <i>p</i> -NH ₂ C ₆ H ₄ OC ₂ H ₅	137.09	2.4	254.2	1.061	
2789	C ₈ H ₁₁ NO	Dimethylaniline oxide C ₆ H ₅ N(CH ₃) ₂ O	137.09	153			
2790	C ₈ H ₁₁ NO	Tyramine <i>p</i> -HOC ₆ H ₄ CH ₂ CH ₂ NH ₂	137.09	161			
2791	C ₈ H ₁₁ NO ₂ S	<i>m</i> -Dimethylanilinesulfonic acid	201.16	266 d.			
2792	C ₈ H ₁₁ NO ₂ S	<i>p</i> -Dimethylanilinesulfonic acid	201.16	257			
2793	C ₈ H ₁₁ NO ₂ S	<i>m</i> -Ethylaniline sulfonic acid	201.16	294 d.			
2794	C ₈ H ₁₁ N ₂ O	Maretin <i>m</i> -CH ₃ .C ₆ H ₄ NH.NHCONH ₂	165.11	184			
2795	C ₈ H ₁₂	Dihydro- <i>o</i> -xylene	108.09		135		
2796	C ₈ H ₁₂	$\Delta^{1,3,5}$ -Dihydro- <i>m</i> -xylene	108.09		130	0.823	497
2797	C ₈ H ₁₂	$\Delta^{1,3,5}$ -Dihydro- <i>p</i> -xylene	108.09		135.6	0.830	529
2798	C ₈ H ₁₂ ClN	ω -Phenylethylamine hydrochloride	157.60	217			
2799	C ₈ H ₁₂ N ₂	Dimethylketene	136.11	86	189		
2800	C ₈ H ₁₂ N ₂	1, 1-Dimethyl- <i>m</i> -phenylenediamine	136.11		258	0.995 ¹¹	
2801	C ₈ H ₁₂ N ₂	1, 1-Dimethyl- <i>p</i> -phenylenediamine	136.11	41	262.3	1.036	
2802	C ₈ H ₁₂ N ₂	2, 6-Dimethylphenylhydrazine	136.11	46			
2803	C ₈ H ₁₂ N ₂	1-Ethyl-1-phenylhydrazine	136.11		237	1.018 ¹¹	
2804	C ₈ H ₁₂ N ₂	1-Ethyl-2-phenylhydrazine	136.11		240		
2805	C ₈ H ₁₂ N ₂ O ₂	Phenylhydrazine acetate	168.11	69			
2806	C ₈ H ₁₂ N ₂ O ₂	<i>n</i> -Butylbarbituric acid	184.11	215			
2807	C ₈ H ₁₂ N ₂ O ₂	1, 3-Diethylbarbituric acid	184.11	52	167 ¹¹		
2808	C ₈ H ₁₂ N ₂ O ₂	5, 5-Diethylbarbituric acid	184.11	191			
2808.1	C ₈ H ₁₂ N ₂ O ₄	Tetraacetylhydrazine [(CH ₃ CO) ₂ N] ₂	200.11	86			1203
2809	C ₈ H ₁₂ O	Amylpropionic aldehyde	124.09		187	0.89 ⁹	
2810	C ₈ H ₁₂ O ₂	Ethyl sorbate CH ₃ (CH ₂ CH) ₂ CO ₂ C ₂ H ₅	140.09		76.5 ¹²	0.936	608

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No
2811	C ₈ H ₁₂ O ₄	Terpenylic acid	172.09	89			
2812	C ₈ H ₁₂ O ₄	Diethyl fumarate (CH ₃ CO ₂ C ₂ H ₃) ₂	172.09	0 6	218.5	1.052	377
2813	C ₈ H ₁₂ O ₄	Diethyl maleate (CH ₃ CO ₂ C ₂ H ₃) ₂	172.09		225	1.067	375
2814	C ₈ H ₁₂ O ₄	Ethyl diacetoacetate	172.09		211 s. d.	1.00	492
2815	C ₈ H ₁₂ O ₄	Dimeric diacetyl	172.09	58		1.560 ^{19, 8}	
2816	C ₈ H ₁₂ O ₄	Ethyl oxalacetate	188.09		132 ²⁴	1.172	905
2816 1	C ₈ H ₁₂ BrO ₄	Diethyl bromoisosuccinate	253.02		122 ¹³	1.3183 ²⁶	
2817	C ₈ H ₁₃ N	Granatic acid	123.11	270			
2818	C ₈ H ₁₃ N	Tropidine	123.11		163	0.946	946
2819	C ₈ H ₁₃ NO	Tropinone	139.11	41	218.5	0.987 ^{99, 6}	1111
2820	C ₈ H ₁₃ NO ₂	Arecolidine	155.11	110			
2821	C ₈ H ₁₃ NO ₂	Arecoline	155.11		220		
2822	C ₈ H ₁₃ NO ₂	Scopoline	155.11	110	243	1.016 ¹⁰⁰	
2823	C ₈ H ₁₃ N ₂ O ₂	Innmodethylbarbituric acid	183.12	205			
2824	C ₈ H ₁₄	<i>n</i> -Hexylacetylene C ₈ H ₁₄ CECH	110.11		125	0.770 ⁰	818
2825	C ₈ H ₁₄	<i>d</i> -Laurolene	110.11		120.5	0.797	397
2826	C ₈ H ₁₄	Methyl- <i>n</i> -amylacetylene	110.11		134		
2827	C ₈ H ₁₄	1, 2, 3, 4-Tetrahydro- <i>m</i> -xylene	110.11		124	0.801	398
2828	C ₈ H ₁₄ BrNO ₂	Arecoline hydrobromide	236.03	168			
2829	C ₈ H ₁₄ ClNO ₂	Arecolidine hydrochloride	191.57	98	250 d.		
2830	C ₈ H ₁₄ O	1, 1-Dimethylcyclohexene-3-ol	126.11		75 ¹⁸	0.933	926
2831	C ₈ H ₁₄ O	2, 2-Dimethylcyclohexanone	126.11		172.5	0.913	426
2832	C ₈ H ₁₄ O	2, 6-Dimethylcyclohexanone	126.11		55.3 ¹⁰	0.914	813
2833	C ₈ H ₁₄ O	Crotonyl ether (CH ₃ CH ₂ CH(CH ₂) ₂ O)	126.11		145	0.890 ⁰	
2834	C ₈ H ₁₄ O	2-Methyl-2-heptene-6-one	126.11	-67.3	174	0.860	
2835	C ₈ H ₁₄ O	Homomesityl oxide	126.11		160 ^{82, 8}	0.863	406
2836	C ₈ H ₁₄ O ₂	Allyl isovalerate C ₈ H ₁₄ CO ₂ C ₃ H ₇	142.11		155		
2837	C ₈ H ₁₄ O ₂	Cyclohexyl acetate CH ₃ CO ₂ C ₆ H ₁₁	142.11		177		
2838	C ₈ H ₁₄ O ₂	Methyl hexahydrobenzoate	142.11		183	0.995 ¹⁵	
2839	C ₈ H ₁₄ O ₂	Duldan	158.11	130			
2840	C ₈ H ₁₄ O ₂	<i>n</i> -Butyric anhydride (C ₄ H ₇ CO) ₂ O	158.11	-75.0	198.2	0.969	
2841	C ₈ H ₁₄ O ₂	Isobutyric anhydride [(CH ₃) ₂ CHCO] ₂ O	158.11	-53.5	182.5	0.950	
2842	C ₈ H ₁₄ O ₂	1-Ethyl-3-acetylbutyric acid	158.11		158 ⁹		
2843	C ₈ H ₁₄ O ₂	<i>n</i> -Amylmalonic acid C ₈ H ₁₄ CH(CO ₂ H) ₂	174.11	82	140 d.		
2844	C ₈ H ₁₄ O ₂	2, 2'-Dimethyladipic acid	174.11	76	321		
2845	C ₈ H ₁₄ O ₂	Suberic acid HO ₂ C(CH ₂) ₆ CO ₂ H	174.11	140	279 ¹⁰⁰		
2846	C ₈ H ₁₄ O ₂	Diethyl methylmalonate	174.11		201.4	1.018	203
2847	C ₈ H ₁₄ O ₂	Diethyl succinate (CH ₃ CO ₂ C ₂ H ₅) ₂	174.11	-20.8	216.5	1.042	246
2848	C ₈ H ₁₄ O ₂	Di- <i>n</i> -propyl oxalate (CO ₂ C ₃ H ₇) ₂	174.11		211	1.018 ²²	
2849	C ₈ H ₁₄ O ₂	Ethyl isopropyl malonate	174.11		217 d.	0.987 ²³	
2849 1	C ₈ H ₁₄ O ₂	Diethyl malate	190.11		253	1.128	355
2850	C ₈ H ₁₄ O ₂	Diethyl <i>d</i> -tartrate [CH(OH)CO ₂ C ₂ H ₅] ₂	206.11	17	280	1.202	421
2851	C ₈ H ₁₅ ClO	Capryl chloride C ₇ H ₁₅ COCl	162.57		196	0.975 ⁸	
2852	C ₈ H ₁₅ N	<i>n</i> -Caprylonitrile C ₇ H ₁₅ CN	125.12		200	0.820 ^{12, 3}	
2853	C ₈ H ₁₅ N	α -Coniceine	125.12	-16	158	0.893 ¹⁶	
2854	C ₈ H ₁₅ N	β -Coniceine	125.12	41	169		
2855	C ₈ H ₁₅ N	γ -Coniceine	125.12	> -50	172	0.872	945
2856	C ₈ H ₁₅ N	δ -Coniceine	125.12		161.5	0.901 ¹⁸	
2857	C ₈ H ₁₅ N	Granatinine	125.12	60			
2858	C ₈ H ₁₅ N	Pseudocconiceine	125.12		172	0.878	
2859	C ₈ H ₁₅ N	Tropine	125.12		167	0.930	975
2860	C ₈ H ₁₅ NO	Granatoline	141.12	134			
2861	C ₈ H ₁₅ NO	Hygrine	141.12		195	0.935	
2862	C ₈ H ₁₅ NO	Pelletierine	141.12		195 d.	0.988 ⁰	
2863	C ₈ H ₁₅ NO	Pseudotropine	141.12	108	243		
2864	C ₈ H ₁₅ NO	Tropine	141.12	63	233	1.016 ¹⁰⁰	1146
2865	C ₈ H ₁₆	Cyclooctane (CH ₂) ₈	112.12	14.4	150.6	0.839	
2866	C ₈ H ₁₆	Dusobutylene (CH ₃) ₂ C:CHC(CH ₃) ₂	112.12		102.6	0.715 ¹⁴	
2867	C ₈ H ₁₆	<i>o</i> -Dimethylcyclohexane	112.12	-57.5	129.4	0.779	317
2868	C ₈ H ₁₆	<i>m</i> -Dimethylcyclohexane	112.12	-85	123.7	0.771	288
2869	C ₈ H ₁₆	<i>p</i> -Dimethylcyclohexane	112.12	-86	120.5	0.769	257
2870	C ₈ H ₁₆	Ethylcyclohexane C ₂ H ₅ C ₆ H ₁₁	112.12		128		
2871	C ₈ H ₁₆	2-Methyl-3-ethyl-2-pentene	112.12		117.1		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2872	C ₈ H ₁₈	2-Methyl-2-heptene (CH ₃) ₂ C=CHC ₂ H ₅	112 12		125.2	0.810	
2873	C ₈ H ₁₈	4-Methyl-3-heptene	112 12		120.4	0.724	219
2874	C ₈ H ₁₈	<i>n</i> -Octylene CH ₃ (CH ₂) ₅ CH=CH ₂	112 12		123	0.722 ¹⁷	
2875	C ₈ H ₁₈ BrNO	Pelletierine hydrobromide	222 05	140			
2876	C ₈ H ₁₈ ClNO	Pelletierine hydrochloride	177 59	145			
2877	C ₈ H ₁₈ N ₂ O ₄	Ethylidene diurethane	201 14	126			
2878	C ₈ H ₁₆ O	1, 2-Dimethylcyclohexanol	128 12		166	0.926 ¹⁴	834
2879	C ₈ H ₁₆ O	<i>d</i> -1, 3-Dimethylcyclohexanol	128 12	72	69 ¹⁴		
2880	C ₈ H ₁₆ O	<i>dl</i> -1, 3-Dimethylcyclohexanol	128 12		169	0.911 ¹⁴	832
2881	C ₈ H ₁₆ O	1, 4-Dimethylcyclohexanol	128 12	50	170		
2882	C ₈ H ₁₆ O	2, 2-Dimethylcyclohexanol	128 12	8	72.2 ¹¹	0.923	496
2883	C ₈ H ₁₆ O	2, 4-Dimethylcyclohexanol	128 12		179	0.912	888
2884	C ₈ H ₁₆ O	2, 5-Dimethylcyclohexanol	128 12		178.5	0.907	887
2885	C ₈ H ₁₆ O	2, 6-Dimethylcyclohexanol	128 12		174.7		
2886	C ₈ H ₁₆ O	3, 3-Dimethylcyclohexanol	128 12	11	99.5 ¹⁰	0.913 ¹⁴	468
2887	C ₈ H ₁₆ O	3, 4-Dimethylcyclohexanol	128 12		180.2	0.907	889
2888	C ₈ H ₁₆ O	<i>cis</i> -3, 5-Dimethylcyclohexanol	128 12		185	0.911	447
2889	C ₈ H ₁₆ O	<i>trans</i> -3, 5-Dimethylcyclohexanol	128 12		187.5	0.902 ¹⁶	463
2890	C ₈ H ₁₆ O	2-Methyl-2-heptene-6-ol	128 12		176	0.854	434
2891	C ₈ H ₁₆ O	Isoamyl allyl ether	128 12		120		
2892	C ₈ H ₁₆ O	<i>n</i> -Caprylic aldehyde C ₇ H ₁₄ CHO	128 12		81 ¹²	0.821	261
2893	C ₈ H ₁₆ O	Ethyl <i>n</i> -amyl ketone C ₇ H ₁₅ COCC ₂ H ₅	128 12		108	0.850 ⁹	
2894	C ₈ H ₁₆ O	Ethyl isoamyl ketone	128 12		163.5		
2895	C ₈ H ₁₆ O	Methylbutyrene	128 12		180	0.827 ¹⁶	
2896	C ₈ H ₁₆ O	Methyl hexyl ketone CH ₃ COCC ₆ H ₁₃	128 12	-21.6	172.7	0.818	225
2897	C ₈ H ₁₆ O	Methyl isoheptyl ketone	128 12		204	0.817	
2898	C ₈ H ₁₆ O	Propyl isobutyl ketone	128 12		155	0.813	
2899	C ₈ H ₁₆ O ₂	<i>n</i> -Caprylic acid CH ₃ (CH ₂) ₆ CO ₂ H	144 12	16	237.5	0.910	296
2900	C ₈ H ₁₆ O ₂	Triethylacetic acid (C ₂ H ₅) ₃ CCO ₂ H	144 12	39.5	202		
2901	C ₈ H ₁₆ O ₂	Isoamyl propionate	144 12		160.2	0.870	163
2901.1	C ₈ H ₁₆ O ₂	<i>d</i> -β-Amyl propionate	144 12		58 ¹⁶	0.866	133
2902	C ₈ H ₁₆ O ₂	<i>tert</i> -Amyl propionate	144 12		113.5	0.855 ¹⁵	
2903	C ₈ H ₁₆ O ₂	Butyl <i>n</i> -butyrate C ₄ H ₉ CO ₂ C ₄ H ₉	144 12		166.4	0.872 ²⁰	148
2904	C ₈ H ₁₆ O ₂	Isobutyl <i>n</i> -butyrate	144 12		156.9	0.866 ¹⁸	140
2905	C ₈ H ₁₆ O ₂	Isobutyl isobutyrate	144 12	-80.7	148.7	0.875 ¹⁴	120
2906	C ₈ H ₁₆ O ₂	<i>tert</i> -Butylethyl acetate	144 12		157		
2907	C ₈ H ₁₆ O ₂	Ethyl <i>n</i> -caproate C ₆ H ₁₃ CO ₂ C ₂ H ₅	144 12		166.6	0.875 ¹⁵	
2908	C ₈ H ₁₆ O ₂	Heptyl formate HCO ₂ (CH ₂) ₆ CH ₃	144 12		176.7	0.894 ⁹	
2909	C ₈ H ₁₆ O ₂	<i>n</i> -Hexyl acetate CH ₃ CO ₂ (CH ₂) ₅ CH ₃	144 12		169.2	0.890 ⁸	
2909.1	C ₈ H ₁₆ O ₂	<i>d</i> -β-Hexyl acetate . . .	144 12		57 ¹⁰	0.864	139
2910	C ₈ H ₁₆ O ₂	Methyl <i>n</i> -heptylate C ₇ H ₁₅ CO ₂ CH ₃	144 12		172.1	0.881 ¹⁵	187
2911	C ₈ H ₁₆ O ₂	<i>n</i> -Propyl <i>n</i> -valerate C ₄ H ₉ CO ₂ C ₃ H ₇	144 12		167.5	0.889 ⁹	
2912	C ₈ H ₁₆ O ₂	<i>n</i> -Propyl isovalerate	144 12		155.9	0.863	141
2913	C ₈ H ₁₆ O ₃	1-Hydroxy- <i>n</i> -caprylic acid	160 12	69.5			
2914	C ₈ H ₁₆ O ₃	Amyl <i>l</i> -lactate CH ₃ CH(OH)CO ₂ C ₄ H ₉	160 12		110.5 ^{11, 6}	0.904 ⁴	
2915	C ₈ H ₁₆ O ₄	Metalddehyde (C ₂ H ₄ O) ₄	176 12		150		1172
2916	C ₈ H ₁₆ O ₄	Paraldol (C ₂ H ₄ O ₂) ₂	176 12	82			
2916.1	C ₈ H ₁₆ O ₄	Bismethoxyacetal	176 12	127			1238
2917	C ₈ H ₁₆ O ₆	Dambouite (Inosite dimethyl ether)	208 12	195	210		
2918	C ₈ H ₁₆ O ₆	2, 3-Dimethyl-α-glucose	208 12	87			
2919	C ₈ H ₁₆ O ₆	2, 3-Dimethyl-β-glucose	208 12	110			
2920	C ₈ H ₁₆ O ₆	<i>d</i> , α-Ethylglucoside	208 12	114			1197
2921	C ₈ H ₁₆ O ₇	Ethyl <i>d</i> -gluconate	224 12	65			
2922	C ₈ H ₁₇ Br	<i>n</i> -Octyl bromide CH ₃ (CH ₂) ₆ CH ₂ Br	193 05		204	1.116 ¹⁴	
2922.1	C ₈ H ₁₇ Br	<i>l</i> -2-Bromooctane	193 05		71 ¹⁴	1.091 ¹⁷	
2923	C ₈ H ₁₇ BrN ₄	Hexamethylenetetramine bromoethylate (Bromalin)	249.08	200			
2924	C ₈ H ₁₇ Cl	<i>n</i> -Octyl chloride CH ₃ (CH ₂) ₆ CH ₂ Cl	148 59		184.6	0.879 ¹⁵	
2925	C ₈ H ₁₇ Cl	2-Chlorooctane C ₈ H ₁₇ CHClCH ₃	148 59		173	0.871 ¹⁵	
2926	C ₈ H ₁₇ F	<i>n</i> -Octyl fluoride CH ₃ (CH ₂) ₆ CH ₂ F	132 13		142.5	0.812 ^{14, 1}	94
2927	C ₈ H ₁₇ I	<i>n</i> -Octyl iodide CH ₃ (CH ₂) ₆ CH ₂ I	240.06	-45.9	225.5	1.341 ^{14, 1, 5}	549
2928	C ₈ H ₁₇ N	<i>d</i> -Conine	127.14	-2.5	166.5	0.845	978
2929	C ₈ H ₁₇ N	2, 4, 6-Trimethylpiperidine	127.14		147	0.831	954

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2930	C ₈ H ₁₇ NO	Conhydrine (Hydroxyconiine)	143.14	118	226		1338
2931	C ₈ H ₁₇ NO	α -Pseudoconhydrine	143.14	106	236.5		
2932	C ₈ H ₁₇ NO ₂	1-Hydroxy- <i>n</i> -caprylic amide	159.14	150			
2933	C ₈ H ₁₈	2, 5-Dimethylhexane	114.14	-91.0	109.2	0.693	87
2934	C ₈ H ₁₈	2, 3-Dimethylhexane	114.14		114.0	0.725 ¹⁴	178
2935	C ₈ H ₁₈	2, 4-Dimethylhexane	114.14		109.9	0.708 ¹⁴	138
2936	C ₈ H ₁₈	3, 4-Dimethylhexane	114.14		116.5	0.721	156
2937	C ₈ H ₁₈	Isooctane (C ₂ H ₅) ₂ CH(CH ₂) ₂ CH ₃	114.14		116.0	0.704 ¹⁴	103
2938	C ₈ H ₁₈	2-Methyl-3-ethylpentane	114.14		114	0.708 ¹⁴	134
2939	C ₈ H ₁₈	3-Methylheptane C ₂ H ₅ CH(CH ₂)C ₄ H ₉	114.14		122.2	0.707	
2940	C ₈ H ₁₈	4-Methylheptane (C ₂ H ₅) ₂ CHCH ₂ CH ₃	114.14		118.0	0.722	114
2941	C ₈ H ₁₈	<i>n</i> -Octane CH ₃ (CH ₂) ₆ CH ₃	114.14	-56.5	124.6	0.707 ¹⁴	112
2942	C ₈ H ₁₈	2-Ethylhexane CH ₃ (C ₂ H ₅)CHC ₃ H ₇	114.14		118.8	0.717 ¹⁴	135
2942 1	C ₈ H ₁₈	3-Ethylhexane (C ₂ H ₅) ₂ CHC ₃ H ₇	114.14		115	0.715	
2943	C ₈ H ₁₈	2, 2, 3, 3-Tetramethylbutane	114.14	104	106.8		
2944	C ₈ H ₁₈	2, 2, 3-Trimethylpentane	114.14		110.8	0.722 ¹⁴	233
2945	C ₈ H ₁₈ BrN	<i>d</i> -Coniine hydrobromide	208.06	211			
2946	C ₈ H ₁₈ ClN	<i>d</i> -Coniine hydrochloride	163.61	217			
2947	C ₈ H ₁₈ ClNO	Pseudoconhydrine hydrochloride	179.61	213			
2948	C ₈ H ₁₈ IN	Coniine hydroiodide	255.08	146			
2949	C ₈ H ₁₈ N ₂ O	Nitrosodisobutylamine	158.16	-5	221	0.893 ¹⁴	
2950	C ₈ H ₁₈ N ₂ O ₄	Coniine nitrate	190.16	83			
2951	C ₈ H ₁₈ O	Dibutyl alcohol	130.14		181.2	0.848 ⁰	
2952	C ₈ H ₁₈ O	Diethylpropyl carbinol	130.14		160.5	0.838	339
2953	C ₈ H ₁₈ O	Dimethyl- <i>n</i> -amyl carbinol	130.14		162	0.879	322
2954	C ₈ H ₁₈ O	Dimethylisoamyl carbinol	130.14		154	0.823	254
2955	C ₈ H ₁₈ O	Ethylisoamyl carbinol	130.14	-61	106	0.808	247
2956	C ₈ H ₁₈ O	1-Hydroxy-2, 5-dimethylhexane	130.14		179.5	0.828	
2957	C ₈ H ₁₈ O	2-Hydroxy-2, 4-dimethylhexane	130.14		151		
2958	C ₈ H ₁₈ O	4-Hydroxy-3-ethylhexane	130.14		164	0.835 ⁰	
2959	C ₈ H ₁₈ O	2-Hydroxy-4-methylheptane	130.14		168		
2960	C ₈ H ₁₈ O	<i>d</i> -6-Hydroxy-3-methylheptane	130.14		169	0.817	
2961	C ₈ H ₁₈ O	4-Hydroxy-2, 2, 4-trimethylpentane	130.14	-20	147.5	0.842 ⁰	
2962	C ₈ H ₁₈ O	Methyl dipropyl carbinol	130.14		161.5	0.823	297
2963	C ₈ H ₁₈ O	Methylethylbutylcarbinol	130.14		160.6	0.827	298
2964	C ₈ H ₁₈ O	Methylethylisobutyl carbinol	130.14		152.4	0.830 ¹⁴	308
2965	C ₈ H ₁₈ O	Methylisohexyl carbinol	130.14		172	0.813	274
2966	C ₈ H ₁₈ O	<i>n</i> -Octyl alcohol CH ₃ (CH ₂) ₇ OH	130.14	-16.3	194	0.827	318
2967	C ₈ H ₁₈ O	<i>d</i> - <i>sec</i> .-Octyl alcohol C ₆ H ₁₃ CH(OH)(CH ₃)	130.14		86 ²⁰	0.822	279
2968	C ₈ H ₁₈ O	<i>dl</i> - <i>sec</i> .-Octyl alcohol C ₆ H ₁₃ CH(OH)(CH ₃)	130.14	-38.6	178.5	0.819	357
2969	C ₈ H ₁₈ O	Propylbutyl carbinol	130.14		71 ¹⁰	0.838 ²	
2970	C ₈ H ₁₈ O	Propylisobutyl carbinol	130.14		164	0.821	248
2971	C ₈ H ₁₈ O	Isopropylbutyl carbinol	130.14		154	0.825	249
2972	C ₈ H ₁₈ O	Isopropylisobutyl carbinol	130.14		163	0.820 ¹⁴	
2973	C ₈ H ₁₈ O	<i>n</i> -Butyl ether C ₄ H ₉ OC ₄ H ₉	130.14		140.9	0.769 ²⁰	
2974	C ₈ H ₁₈ O	Isobutyl ether [(CH ₃) ₂ CHCH ₂] ₂ O	130.14		122.5	0.762	
2975	C ₈ H ₁₈ O	<i>sec</i> .-Butyl ether (C ₂ H ₅ CHCH ₂) ₂ O	130.14		121	0.756 ²¹	
2976	C ₈ H ₁₈ O	Ethyl hexyl ether C ₂ H ₅ OC ₆ H ₁₃	130.14		137		
2977	C ₈ H ₁₈ O	Methyl <i>n</i> -heptyl ether CH ₃ OC ₇ H ₁₅	130.14		149.8	0.795 ²	
2978	C ₈ H ₁₈ O ₂ S	<i>n</i> -Butylsulfone (C ₄ H ₉) ₂ SO ₂	178.20	43.5			
2979	C ₈ H ₁₈ O ₄	Ethyl orthoacetate CH ₃ CH(OC ₂ H ₅) ₂	162.14		142	0.94 ²²	
2980	C ₈ H ₁₈ O ₄ S ₄	Trional C ₂ H ₅ (CH ₂)C(SO ₂ C ₂ H ₅) ₂	242.27	76			
2981	C ₈ H ₁₈ S	Di- <i>n</i> -butyl sulfide (C ₄ H ₉) ₂ S	146.20	-79.7	182	0.852 ⁹	
2982	C ₈ H ₁₈ S	Diisobutyl sulfide [(CH ₃) ₂ CHCH ₂] ₂ S	146.20		171	0.836 ¹⁰	
2983	C ₈ H ₁₈ S	Di- <i>sec</i> .-butyl sulfide [C ₂ H ₅ CH(CH ₃) ₂] ₂ S	146.20		165	0.832 ²¹	
2984	C ₈ H ₁₉ N	Di- <i>n</i> -butylamine (C ₄ H ₉) ₂ NH	129.15		161		
2985	C ₈ H ₁₉ N	Diisobutylamine [(CH ₃) ₂ CHCH ₂] ₂ NH	129.15	-70.0	138.8	0.745	180
2986	C ₈ H ₁₉ N	<i>n</i> -Octylamine C ₈ H ₁₇ NH ₂	129.15		180	0.777 ²⁷	319
2987	C ₈ H ₁₉ N	<i>sec</i> .-Octylamine C ₆ H ₁₃ CH(CH ₃)NH ₂	129.15		164	0.771	292
2988	C ₈ H ₁₉ As ₃	Ethylcacodyl (C ₂ H ₅) ₂ As ₂ (C ₂ H ₅) ₂	266.07		190		
2989	C ₈ H ₁₇ NO	Tetraethylammonium hydroxide	147.17	190 d.			
2990	C ₈ H ₇ O ₄	Phthalonic anhydride	176.03	186			
2991	C ₈ H ₇ Cl ₂ N	2, 3-Dichloroquinoline	197.96	105			
2992	C ₈ H ₇ Cl ₂ N	2, 4-Dichloroquinoline	197.96	67			

C-TABLE: C₈H₈ TO C₈H₆

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No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2993	C ₈ H ₆ Cl ₂ N	5, 6-Dichloroquinoline	197.96	85			
2994	C ₈ H ₆ Cl ₂ N	5, 7-Dichloroquinoline	197.96	117			
2995	C ₈ H ₆ Cl ₂ N	5, 8-Dichloroquinoline	197.96	93			
2996	C ₈ H ₆ Cl ₂ N	6, 8-Dichloroquinoline	197.96	104			
2997	C ₈ H ₆ Cl ₂ N	7, 8-Dichloroquinoline	197.96	85.5			
2998	C ₈ H ₆ Br ₂ O ₂	<i>cis</i> -1, 2-Dibromocinnamic acid	216.96	100	124° ^b		
2999	C ₈ H ₆ Br ₂ O ₂	<i>trans</i> -1, 2-Dibromocinnamic acid	216.96	136	138° ^b		
3000	C ₈ H ₆ ClN	2-Chloroquinoline	163.51	38	275		
3001	C ₈ H ₆ ClN	3-Chloroquinoline	163.51		255.5		
3002	C ₈ H ₆ ClN	4-Chloroquinoline	163.51	34	260.4	1.251	
3003	C ₈ H ₆ ClN	5-Chloroquinoline	163.51	32	268		
3004	C ₈ H ₆ ClN	6-Chloroquinoline	163.51	41	262		
3005	C ₈ H ₆ ClN	7-Chloroquinoline	163.51	45	256		
3006	C ₈ H ₆ ClN	8-Chloroquinoline	163.51	> -20	288		
3007	C ₈ H ₆ Cl ₂ O ₂	<i>cis</i> -1, 2-Dichlorocinnamic acid	216.96	121			
3008	C ₈ H ₆ Cl ₂ O ₂	<i>trans</i> -1, 2-Dichlorocinnamic acid	216.96	101			
3009	C ₈ H ₆ INO ₂ S	Loretin	351.05	d.			
3010	C ₈ H ₆ N ₂ O ₂	5-Nitroquinoline	174.06	72			
3011	C ₈ H ₆ N ₂ O ₂	6-Nitroquinoline	174.06	150			
3012	C ₈ H ₆ N ₂ O ₂	7-Nitroquinoline	174.06	133			
3013	C ₈ H ₆ N ₂ O ₂	8-Nitroquinoline	174.06	89			
3014	C ₈ H ₆ O ₂	Phenylpropionic acid C ₈ H ₆ CH ₂ CO ₂ H	146.04	137			
3015	C ₈ H ₆ O ₂	Chromone	146.04	58			
3016	C ₈ H ₆ O ₂	Coumarine	146.04	67	301.7	0.935	
3017	C ₈ H ₆ O ₂	Umbelliferon	162.04	227			
3018	C ₈ H ₆ O ₂	Daphnetin	178.05	256			
3019	C ₈ H ₆ O ₂	Esculetin	178.05	270 d.			
3020	C ₈ H ₆ O ₂	Hemimellitic acid 1, 2, 3-C ₆ H ₃ (CO ₂ H) ₃	210.04	190			
3021	C ₈ H ₆ O ₂	Trimellitic acid 1, 2, 4-C ₆ H ₃ (CO ₂ H) ₃	210.05	216			
3022	C ₈ H ₆ O ₂	Trimesic acid 1, 3, 5-C ₆ H ₃ (CO ₂ H) ₃	210.05	350			
3023	C ₈ H ₆ O ₇	1, 3, 5-Tricarboxyphenol	226.05	180 d.			
3024	C ₈ H ₆ BrO ₂	<i>cis</i> -Allo-1-bromocinnamic acid	226.97	120	111° ^b		
3025	C ₈ H ₆ BrO ₂	<i>cis</i> -Allo-2-bromocinnamic acid	226.97	160	111° ^b		
3026	C ₈ H ₆ BrO ₂	<i>trans</i> -1-Bromocinnamic acid	226.97	131	121° ^b		
3027	C ₈ H ₆ BrO ₂	<i>trans</i> -2-Bromocinnamic acid	226.97	135	122° ^b		
3028	C ₈ H ₇ ClO	Cinnamyl chloride C ₈ H ₇ CH ₂ CHCOCl	166.51	36	257.5		
3029	C ₈ H ₇ ClO ₂	<i>cis</i> -Allo-1-chlorocinnamic acid	182.51	111	99° ^b		
3030	C ₈ H ₇ ClO ₂	<i>cis</i> -Allo-2-chlorocinnamic acid	182.51	132	97° ^b		
3031	C ₈ H ₇ ClO ₂	<i>trans</i> -1-Chlorocinnamic acid	182.51	137	109° ^b		
3032	C ₈ H ₇ ClO ₂	<i>trans</i> -2-Chlorocinnamic acid	182.51	142	113° ^b		
3033	C ₈ H ₇ ClO ₂	<i>o</i> -Chlorocinnamic acid	182.51	211			
3034	C ₈ H ₇ Cl ₂ O ₂	Benzyl trichloroacetate	253.43		178.5° ^b	1.389 ^d	692
3035	C ₈ H ₇ N	Cinnamic nitrile C ₈ H ₇ CH ₂ CHCN	129.06	11	255	1.037°	
3036	C ₈ H ₇ N	Isoquinoline	129.06	23	243	1.000	1026
3037	C ₈ H ₇ N	Quinoline	129.06	-19.5	237.7	1.093	941
3038	C ₈ H ₇ NO	<i>p</i> -Cyanoacetophenone CN.C ₆ H ₄ COCH ₃	145.06	61			
3039	C ₈ H ₇ NO	2-Hydroxyquinoline	145.06	200			
3040	C ₈ H ₇ NO	4-Hydroxyquinoline	145.06	201	300		
3041	C ₈ H ₇ NO	5-Hydroxyquinoline	145.06	224			
3042	C ₈ H ₇ NO	6-Hydroxyquinoline	145.06	193	360		
3043	C ₈ H ₇ NO	7-Hydroxyquinoline	145.06	238 d.			
3044	C ₈ H ₇ NO	8-Hydroxyquinoline	145.06	76	266.9		
3045	C ₈ H ₇ NO ₂	3-Aminocoumarine	161.06	130			
3046	C ₈ H ₇ NO ₂	Indole-2-carboxylic acid	161.06	203 d.			
3047	C ₈ H ₇ NO ₂	Indole-3-carboxylic acid	161.06	218 d.			
3048	C ₈ H ₇ NO ₂	Indoxyl acid	177.06		123		
3049	C ₈ H ₇ NO ₂	Kynuric acid	177.06	189			
3050	C ₈ H ₇ NO ₂	<i>o</i> -Nitrocinnamic acid	193.06	240			
3051	C ₈ H ₇ NO ₂	<i>m</i> -Nitrocinnamic acid	193.06	197			
3052	C ₈ H ₇ NO ₂	<i>p</i> -Nitrocinnamic acid	193.06	286			
3053	C ₈ H ₇ NO ₂ S	Diaphthol	225.13	295			
3054	C ₈ H ₈	Indene	116.06	-2	182.4	1.006	806
3055	C ₈ H ₈	Phenylallylene C ₈ H ₈ C ₂ CCH ₃	116.06		185		
3056	C ₈ H ₈ Cl ₂	Cinnamal chloride C ₈ H ₇ CH ₂ CHCl	186.98	58.5	143° ^b		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3057	C ₉ H ₇ Cl ₂ O ₂	Benzyl dichloroacetate	218.98		179 ⁴⁰	1.313 ₄ ¹	684
3058	C ₉ H ₇ I ₂ O ₂	Ethyl 3, 5-diodosalicylate	417.93	132			
3059	C ₉ H ₇ N ₂	2-Aminoquinoline	144.08	129			1319
3060	C ₉ H ₇ N ₂	3-Aminoquinoline	144.08	94			
3061	C ₉ H ₇ N ₂	4-Aminoquinoline	144.08	154			
3062	C ₉ H ₇ N ₂	5-Aminoquinoline	144.08	110			
3063	C ₉ H ₇ N ₂	6-Aminoquinoline	144.08	114			
3064	C ₉ H ₇ N ₂	7-Aminoquinoline	144.08	189			
3065	C ₉ H ₇ N ₂	8-Aminoquinoline	144.08	70			
3066	C ₉ H ₇ N ₂	3-Phenylpyrazolone	144.08	240			
3067	C ₉ H ₇ N ₂ O	Cyanoacetamide C ₉ H ₇ CONHC ₆ H ₅	160.08	200			
3068	C ₉ H ₇ N ₂ O	Pyrrone (Dipyril ketone)	160.08	160			
3069	C ₉ H ₇ O	Cinnamic aldehyde C ₉ H ₇ CH ₂ CHCHO	132.06	-7.5	251.0	1.049	791
3070	C ₉ H ₇ O	α -Hydrindone	132.06	41	244	1.101 ⁴⁶	
3071	C ₉ H ₇ O	β -Hydrindone	132.06	61	225 d.	1.071 ⁴⁷	1100
3072	C ₉ H ₇ O ₂	<i>o</i> -Coumaric aldehyde	148.06	133			
3073	C ₉ H ₇ O ₂	<i>p</i> -Coumaric aldehyde	148.06	134			
3074	C ₉ H ₇ O ₂	Alloctannic acid	148.06	68	125 ¹⁰		
3075	C ₉ H ₇ O ₂	Cinnamic acid C ₉ H ₇ CH ₂ CHCO ₂ H	148.06	133	300	1.284 ¹	
3076	C ₉ H ₇ O ₂	Isocinnamic acid	148.06	57	256 d.		
3077	C ₉ H ₇ O ₂	Atropic acid	148.06	107	267 d.		
3078	C ₉ H ₇ O ₂	Melilotic anhydride	148.06	25	272		
3079	C ₉ H ₇ O ₂	Chromanone	148.06	38.5	160 ⁵⁰		
3080	C ₉ H ₇ O ₂	Acetopiperone	164.06	83			
3081	C ₉ H ₇ O ₂	<i>o</i> -Acetylsalicylic aldehyde	164.06	37	253		
3082	C ₉ H ₇ O ₂	Benzoylacetic acid C ₉ H ₇ COCH ₂ CO ₂ H	164.06	104			
3083	C ₉ H ₇ O ₂	<i>o</i> -Coumaric acid	164.06	208			
3084	C ₉ H ₇ O ₂	<i>m</i> -Coumaric acid	164.06	191			
3085	C ₉ H ₇ O ₂	<i>p</i> -Coumaric acid	164.06	206			
3086	C ₉ H ₇ O ₂	Phenylpyruvic acid C ₉ H ₇ CH ₂ COCO ₂ H	164.06	157			
3087	C ₉ H ₇ O ₄	<i>o</i> -Acetylsalicylic acid (Aspirin)	180.06	133.5			1290
3088	C ₉ H ₇ O ₄	Caffeic acid	180.06	195			
3089	C ₉ H ₇ O ₄	Phenylmalonic acid C ₉ H ₇ CH(CO ₂ H) ₂	180.06	153			
3090	C ₉ H ₇ O ₄	Uvic acid 3, 5(CO ₂ H) ₂ C ₆ H ₃ CH ₃	180.06	290			
3091	C ₉ H ₇ O ₄	Methyl phthalate <i>o</i> -CO ₂ HC ₆ H ₄ CO ₂ CH ₃	180.06	82.5			
3092	C ₉ H ₇ O ₄	Benzoyl acetyl peroxide	180.06	36.6	130 ¹⁰		
3093	C ₉ H ₇ O ₄	Esculetinic acid	196.06	168			
3094	C ₉ H ₇ O ₄	Myristicinic acid	196.06	210	300		
3095	C ₉ H ₇ BrO	Indene oxybromide	212.99	130.5			
3096	C ₉ H ₇ ClO ₂	Benzyl chloroacetate	184.53		147.5 ⁹	1.222 ₄ ¹	675
3097	C ₉ H ₇ N	Dihydroquinoline	131.08	226			
3098	C ₉ H ₇ N	1-Methylindole	131.08		242.4	1.071 ⁹	
3099	C ₉ H ₇ N	2-Methylindole	131.08	60	272.3		
3100	C ₉ H ₇ N	3-Methylindole (Santole)	131.08	95	266.2		
3101	C ₉ H ₇ N	5-Methylindole	131.08	58.5			
3102	C ₉ H ₇ NO	Cinnamamide C ₉ H ₇ CH ₂ CHCONH ₂	147.08	141.5			
3103	C ₉ H ₇ NO	Hydrocinnostyrid	147.08	163			1309
3104	C ₉ H ₇ NO ₂	<i>o</i> -Aminocinnamic acid	163.08	159 d.			
3105	C ₉ H ₇ NO ₂	<i>m</i> -Aminocinnamic acid	163.08	181			
3106	C ₉ H ₇ NO ₂	<i>p</i> -Aminocinnamic acid	163.08	176 d.			
3107	C ₉ H ₇ NO ₂	Benzoylacetalddehydeoxime	163.08	87			
3108	C ₉ H ₇ NO ₂	<i>o</i> -Acetylaminobenzoic acid	179.08	185			
3109	C ₉ H ₇ NO ₂	<i>m</i> -Acetylaminobenzoic acid	179.08	250			
3110	C ₉ H ₇ NO ₂	<i>p</i> -Acetylaminobenzoic acid	179.08	252			
3111	C ₉ H ₇ NO ₂	Hippuric acid C ₉ H ₇ CONHCH ₂ CO ₂ H	179.08	187.5	d.	1.371	1256
3112	C ₉ H ₇ NO ₂	Methyl oxanilate C ₉ H ₇ NHCOCO ₂ CH ₃	179.08	114			
3113	C ₉ H ₇ NO ₂	Acetylsalicylamide	179.08	144			
3114	C ₉ H ₇ NO ₄	Salicylic acid	195.08	160			
3115	C ₉ H ₇ NO ₄	Ethyl <i>m</i> -nitrobenzoate	195.08	47	298		
3116	C ₉ H ₇ NO ₄	Ethyl <i>p</i> -nitrobenzoate	195.08	57			
3117	C ₉ H ₇ N ₂	5, 8-Diaminoquinoline	159.09	156			
3118	C ₉ H ₇ N ₂	6, 8-Diaminoquinoline	159.09	163			
3119	C ₉ H ₁₀	Benzylethylene C ₉ H ₇ CH ₂ CH ₂ CH ₃	118.08		155	0.909	654

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3120	C ₈ H ₁₀	Isoallylbenzene C ₈ H ₁₀ CH ₂ CHCH ₃	118 08		175	0 924 ¹⁴	
3121	C ₈ H ₁₀	Hydrindene	118 08		176 5	0 965	970
3122	C ₈ H ₁₀ N ₂	1-Ethylindazole	146 09		120 ¹⁵	1 064	878
3123	C ₈ H ₁₀ O ₂	2-Acetamino-4-nitrotoluene	194 09	96			
3124	C ₈ H ₁₀ O	Anol <i>p</i> -(CH ₃ CH ₂ CH)C ₆ H ₄ OH	134 08	93	250 d.		
3125	C ₈ H ₁₀ O	Chavicol <i>p</i> -(CH ₃ :CHCH ₂)C ₆ H ₄ OH	134 08	> -25	237	1 033 ¹⁴	935
3126	C ₈ H ₁₀ O	Cinnamyl alcohol C ₈ H ₁₀ CH ₂ CHCH ₂ OH	134 08	33	258 5	1 044	1039
3127	C ₈ H ₁₀ O	Allyl phenyl ether C ₈ H ₁₀ OC ₆ H ₅	134 08		192		
3128	C ₈ H ₁₀ O	Methyl styryl ether	134 08		213	1 001	877
3129	C ₈ H ₁₀ O	2, 4-Dimethylbenzaldehyde	134 08	-8	216		
3130	C ₈ H ₁₀ O	Hydrocinnamaldehyde	134 08	47	280		
3131	C ₈ H ₁₀ O	<i>o</i> -Xylene-4-aldehyde	134 08		225		
3132	C ₈ H ₁₀ O	Ethyl phenyl ketone C ₈ H ₁₀ COC ₆ H ₅	134 08	21	218	1 010	689
3133	C ₈ H ₁₀ O	Methyl benzyl ketone CH ₃ COCH ₂ C ₆ H ₅	134 08	-15 4	216 7	1 028	
3134	C ₈ H ₁₀ O	<i>p</i> -Methylacetophenone (Melilot)	134 08		222	1 013 ¹³	703
3135	C ₈ H ₁₀ O	Chromane	134 08		95 ¹²	1 064	
3135 1	C ₈ H ₁₀ OS	Ethyl thiobenzoate	166 14		253 ^{16,17}	1 004 ¹²	
3136	C ₈ H ₁₀ O ₂	<i>o</i> -Coumaral alcohol	150 08	119			
3137	C ₈ H ₁₀ O ₂	Hesperetol	150 08	57			
3138	C ₈ H ₁₀ O ₂	2, 3-Dimethylbenzoic acid	150 08	144			
3139	C ₈ H ₁₀ O ₂	2, 4-Dimethylbenzoic acid	150 08	126	208		
3140	C ₈ H ₁₀ O ₂	2, 5-Dimethylbenzoic acid	150 08	132	208	1 069	
3141	C ₈ H ₁₀ O ₂	2, 6-Dimethylbenzoic acid	150 08	116			
3142	C ₈ H ₁₀ O ₂	3, 4-Dimethylbenzoic acid	150 08	165			
3143	C ₈ H ₁₀ O ₂	<i>o</i> -Ethylbenzoic acid	150 08	68			
3144	C ₈ H ₁₀ O ₂	<i>m</i> -Ethylbenzoic acid	150 08	47		1 042 ¹⁶	1148
3145	C ₈ H ₁₀ O ₂	<i>p</i> -Ethylbenzoic acid	150 08	113			
3146	C ₈ H ₁₀ O ₂	Hydratropic acid C ₈ H ₈ (C ₆ H ₅)CO ₂ H	150 08		265		
3147	C ₈ H ₁₀ O ₂	Hydrocinnamic acid	150 08	48 0	279 8	1 071 ^{18, 17}	
3148	C ₈ H ₁₀ O ₂	Mesitylinic acid 3, 5-(CH ₃) ₂ C ₆ H ₃ CO ₂ H	150 08	166			
3149	C ₈ H ₁₀ O ₂	Benzyl acetate CH ₃ CO ₂ CH ₂ C ₆ H ₅	150 08	-51 5	213 5	1 058	673
3150	C ₈ H ₁₀ O ₂	<i>o</i> -Cresyl acetate <i>o</i> -CH ₃ CO ₂ C ₆ H ₄ CH ₃	150 08		208		
3151	C ₈ H ₁₀ O ₂	<i>m</i> -Cresyl acetate <i>m</i> -CH ₃ CO ₂ C ₆ H ₄ CH ₃	150 08		212		
3152	C ₈ H ₁₀ O ₂	<i>p</i> -Cresyl acetate <i>p</i> -CH ₃ CO ₂ C ₆ H ₄ CH ₃	150 08		212 5	1 050	599
3154	C ₈ H ₁₀ O ₂	Ethyl benzoate C ₈ H ₈ CO ₂ C ₂ H ₅	150 08	-31 6	213 2	1 047	628
3155	C ₈ H ₁₀ O ₂	Methyl phenylacetate	150 08		220	1 044 ¹⁶	
3156	C ₈ H ₁₀ O ₂	Methyl <i>p</i> -toluate <i>p</i> -CH ₃ C ₆ H ₄ CO ₂ CH ₃	150 08	33	217		
3157	C ₈ H ₁₀ O ₂	Phenyl propionate C ₈ H ₈ CO ₂ C ₆ H ₅	150 08	20	211	1 054 ¹⁶	
3158	C ₈ H ₁₀ O ₂	Acetovanillone	166 08	115	300		
3159	C ₈ H ₁₀ O ₂	Paconol 4, 2-CH ₃ O(OH)C ₆ H ₃ CO ₂ CH ₃	166 08	50			
3160	C ₈ H ₁₀ O ₂	<i>o</i> -Ethoxybenzoic acid	166 08	22			
3161	C ₈ H ₁₀ O ₂	<i>m</i> -Ethoxybenzoic acid	166 08	137			
3162	C ₈ H ₁₀ O ₂	<i>p</i> -Ethoxybenzoic acid	166 08	195			
3163	C ₈ H ₁₀ O ₂	<i>dl</i> -Atrolactic acid	166 08	91			
3164	C ₈ H ₁₀ O ₂	<i>m</i> -Hydrocoumaric acid	166 08	111			
3165	C ₈ H ₁₀ O ₂	Mehlotie acid	166 08	83			
3166	C ₈ H ₁₀ O ₂	<i>d</i> (<i>l</i>)-2-Phenyllactic acid	166 08	125			
3167	C ₈ H ₁₀ O ₂	Phloretic acid HOC ₆ H ₄ CH(CH ₃)CO ₂ H	166 08	129			
3168	C ₈ H ₁₀ O ₂	<i>d</i> (<i>l</i>)-Tropic acid	166 08	128			
3169	C ₈ H ₁₀ O ₂	<i>dl</i> -Tropic acid	166 08	123			
3169 1	C ₈ H ₁₀ O ₂	Anisyl acetate <i>p</i> -CH ₃ OC ₆ H ₄ O ₂ CCH ₃	166 08		139 ¹²	1 101	
3170	C ₈ H ₁₀ O ₂	Ethyl salicylate OHC ₆ H ₄ CO ₂ C ₂ H ₅	166 08	1 3	231 5	1 131	670
3171	C ₈ H ₁₀ O ₂	Guaiacyl acetate (Eucol)	166 08		240	1 138	
3172	C ₈ H ₁₀ O ₂	Methyl anisate <i>p</i> -CH ₃ OC ₆ H ₄ CO ₂ CH ₃	166 08	48	256		
3173	C ₈ H ₁₀ O ₂	Methyl <i>o</i> -cresotinate	166 08	30	235		
3174	C ₈ H ₁₀ O ₂	Methyl <i>p</i> -cresotinate	166 08		242		
3175	C ₈ H ₁₀ O ₂	Methyl <i>dl</i> -mandelate	166 08	58	144 ²⁰		
3176	C ₈ H ₁₀ O ₄	Hydrocaffeic acid	182 08	139			
3177	C ₈ H ₁₀ O ₄	<i>d</i> (<i>l</i>)-Phenylglyceric acid	182 08	164			
3178	C ₈ H ₁₀ O ₄	<i>dl</i> -Phenylglyceric acid	182 08	141		1 451	
3179	C ₈ H ₁₀ O ₄	<i>d</i> (<i>l</i>)- <i>p</i> -Methoxymandelic acid	182 08	105		1 354	
3181	C ₈ H ₁₀ O ₄	Veratric acid 3, 4-(CH ₃ O) ₂ C ₆ H ₃ CO ₂ H	182 08	181			
3182	C ₈ H ₁₀ O ₄	Methoxymethyl salicylate	182 08		162 ⁴²	1 200 ¹⁸	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3183	C ₉ H ₁₀ O ₄	Methyl vanillate	182.08	63	287		
3184	C ₉ H ₁₀ O ₄	Glycol salicylate (Spirosal)	182.08		170 ¹²		
3185	C ₉ H ₁₀ O ₅	Syringic acid	198.08	245			
3186	C ₉ H ₁₀ O ₅	Ethyl gallate	198.08	160			
3187	C ₉ H ₁₀ O ₅	2, 3, 4, 5-Dimethoxydihydroxybenzoic acid	214.08	148			
3187.1	C ₉ H ₁₀ S ₂	Ethyl dithiobenzoate	182.21		180 ¹²	1.1439 ¹²	
3188	C ₉ H ₁₁ N	Allylamine C ₃ H ₅ NHCH ₂ CH ₂ CH ₃	133.09		209	0.982 ¹²	
3189	C ₉ H ₁₁ N	Benzylideneethylamine	133.09		195.4		
3190	C ₉ H ₁₁ N	Styrylamine C ₆ H ₅ CH=CHCH ₂ NH ₂	133.09		237		
3191	C ₉ H ₁₁ N	1, 2, 3, 4-Tetrahydroisoquinoline	133.09		233	1.064	1012
3192	C ₉ H ₁₁ N	1, 2, 3, 4-Tetrahydroquinoline	133.09	20	251	1.055	1013
3193	C ₉ H ₁₁ NO	<i>p</i> -Dimethylaminobenzaldehyde	149.09	75			
3194	C ₉ H ₁₁ NO	<i>o</i> -Acetotoluide <i>o</i> -CH ₃ CONHC ₆ H ₄ CH ₃	149.09	110	296		
3195	C ₉ H ₁₁ NO	<i>m</i> -Acetotoluide <i>m</i> -CH ₃ CONHC ₆ H ₄ CH ₃	149.09	65.5	303		1255
3196	C ₉ H ₁₁ NO	<i>p</i> -Acetotoluide <i>p</i> -CH ₃ CONHC ₆ H ₄ CH ₃	149.09	153	307		1276
3197	C ₉ H ₁₁ NO	<i>N</i> -Benzylacetamide CH ₃ CONHC ₆ H ₅	149.09	61	300		
3198	C ₉ H ₁₁ NO	<i>N</i> -Ethylbenzamide C ₆ H ₅ CONHC ₂ H ₅	149.09	71	290		
3199	C ₉ H ₁₁ NO	<i>N</i> -Methylacetanilide (Exalgine)	149.09	102	254.7		1250
3200	C ₉ H ₁₁ NO	Propionanilide C ₂ H ₅ CONHC ₆ H ₅	149.09	104			
3201	C ₉ H ₁₁ NOS	<i>N</i> -Phenylthiourethane	181.16	69			
3202	C ₉ H ₁₁ NO ₂	4-Acetylamino-2-hydroxytoluene	165.09	225			
3203	C ₉ H ₁₁ NO ₂	3-Acetylamino-4-hydroxytoluene	165.09	160			
3204	C ₉ H ₁₁ NO ₂	<i>p</i> -Acetylmethylaminophenol	165.09	240			
3205	C ₉ H ₁₁ NO ₂	1-Aminopropionic acid	165.09	162			
3206	C ₉ H ₁₁ NO ₂	<i>o</i> -Dimethylanthranilic acid	165.09	175			
3207	C ₉ H ₁₁ NO ₂	<i>m</i> -Ethylaminobenzoic acid	165.09	101			
3208	C ₉ H ₁₁ NO ₂	<i>l</i> -Phenylalanine	165.09	283 d.			1269
3209	C ₉ H ₁₁ NO ₂	<i>dl</i> -Phenylalanine	165.09	265 d.			
3210	C ₉ H ₁₁ NO ₂	<i>o</i> -Tolylaminoacetic acid	165.09	150			
3211	C ₉ H ₁₁ NO ₂	<i>p</i> -Tolylaminoacetic acid	165.09	118			
3212	C ₉ H ₁₁ NO ₂	2, 4, 6-Trimethylpyridine-3-carboxylic acid	165.09		155		
3213	C ₉ H ₁₁ NO ₂	Ethyl <i>p</i> -aminobenzoate	165.09	91			
3214	C ₉ H ₁₁ NO ₂	Ethyl anthranilate	165.09		260		
3216	C ₉ H ₁₁ NO ₂	<i>o</i> -Acetanilide <i>o</i> -CH ₃ OC ₆ H ₄ NHCOCH ₃	165.09	84	305		
3217	C ₉ H ₁₁ NO ₂	<i>p</i> -Acetanilide CH ₃ CONHC ₆ H ₄ OCH ₃	165.09	127			
3218	C ₉ H ₁₁ NO ₂	<i>p</i> -Formylphenetidine	165.09	60			
3219	C ₉ H ₁₁ NO ₂	Nitrocumene (CH ₃) ₂ CHC ₆ H ₄ NO ₂	165.09	-35	224 d.		
3220	C ₉ H ₁₁ NO ₂	Nitromesitylene	165.09	44	255		
3221	C ₉ H ₁₁ NO ₂	<i>N</i> -Phenylurethane C ₂ H ₅ CO ₂ NHC ₆ H ₅	165.09	52	238		
3222	C ₉ H ₁₁ NO ₂	<i>l</i> -Tyrosine	181.09	295 d.		1.456	1259
3223	C ₉ H ₁₂	Cumene (CH ₃) ₂ CHC ₆ H ₅	120.09		153.4	0.864	561
3224	C ₉ H ₁₂	<i>o</i> -Ethyltoluene <i>o</i> -C ₂ H ₅ C ₆ H ₄ CH ₃	120.09	> -17	162	0.882	615
3225	C ₉ H ₁₂	<i>m</i> -Ethyltoluene <i>m</i> -C ₂ H ₅ C ₆ H ₄ CH ₃	120.09		162.5	0.867	585
3226	C ₉ H ₁₂	<i>p</i> -Ethyltoluene <i>p</i> -C ₂ H ₅ C ₆ H ₄ CH ₃	120.09	< -20	162	0.862	568
3227	C ₉ H ₁₂	Hemimellitene 1, 2, 3-(CH ₃) ₃ C ₆ H ₃	120.09		176.5	0.895	650
3228	C ₉ H ₁₂	Mesitylene 1, 3, 5-(CH ₃) ₃ C ₆ H ₃	120.09	-52.7	164.6	0.863	580
3229	C ₉ H ₁₂	<i>n</i> -Propylbenzene CH ₃ (CH ₂) ₂ C ₆ H ₅	120.09	-101.6	157.5	0.862	556
3230	C ₉ H ₁₂	Pseudocumene 1, 2, 4-(CH ₃) ₃ C ₆ H ₃	120.09	-61.0	169.8	0.87	622
3231	C ₉ H ₁₃ N ₂ O	1-Ethyl-2-phenylurea	164.11	99			
3232	C ₉ H ₁₃ N ₂ O ₂	<i>p</i> -Phenetylurea C ₂ H ₅ OC ₆ H ₄ NHCONH ₂	180.11	173			
3233	C ₉ H ₁₃ N ₂ O ₂	Phosmine	180.11	79	300 ¹²		
3234	C ₉ H ₁₃ N ₂ O ₂	1, 3, 7, 9-Tetramethyluric acid	224.12	228	d.		1268
3235	C ₉ H ₁₂ O	Benzylmethyl carbinol	136.09		212	0.994	
3235.1	C ₉ H ₁₂ O	<i>d</i> -Benzylmethyl carbinol	136.09		125 ¹²	0.991	660
3236	C ₉ H ₁₂ O	Ethylphenyl carbinol	136.09		219	0.996	
3237	C ₉ H ₁₂ O	Hydrocinnamyl alcohol	136.09	< -18	237.4	1.008	706
3238	C ₉ H ₁₂ O	Mesitol 2, 4, 6-(CH ₃) ₃ C ₆ H ₃ OH	136.09	69	220		
3239	C ₉ H ₁₂ O	<i>o</i> - <i>n</i> -Propylphenol <i>o</i> -C ₃ H ₇ C ₆ H ₄ OH	136.09		226.6	1.015°	
3240	C ₉ H ₁₂ O	<i>m</i> - <i>n</i> -Propylphenol <i>m</i> -C ₃ H ₇ C ₆ H ₄ OH	136.09	26	228		
3241	C ₉ H ₁₂ O	<i>p</i> - <i>n</i> -Propylphenol <i>p</i> -C ₃ H ₇ C ₆ H ₄ OH	136.09	61	232.6	1.009°	
3242	C ₉ H ₁₂ O	Pseudocumenol 2, 4, 5-(CH ₃) ₃ C ₆ H ₃ OH	136.09	72	235		

C-TABLE: C₉H₁₂ TO C₉H₁₄

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No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3243	C ₉ H ₁₂ O	Ethyl benzyl ether C ₉ H ₁₀ OC ₂ H ₅	136.09		226	0.998 ^{17,18}	
3244	C ₉ H ₁₂ O	Ethyl <i>m</i> -cresyl ether	136.09		192	0.949	648
3245	C ₉ H ₁₂ O	Ethyl <i>p</i> -cresyl ether <i>p</i> -CH ₃ C ₆ H ₄ OC ₂ H ₅	136.09		189.9	0.874 ⁹	928
3246	C ₉ H ₁₂ O	Propyl phenyl ether C ₉ H ₁₀ OC ₃ H ₇	136.09		190.5	0.968	
3247	C ₉ H ₁₂ O	Isopropyl phenyl ether	136.09		177.2	0.946 ¹⁹	
3248	C ₉ H ₁₂ O ₂	Mesorcinol	152.09	150	275.5		
3249	C ₉ H ₁₂ O ₂	Guaiacyl ethyl ether	152.09		213		
3250	C ₉ H ₁₂ O ₂	Phloroglucinol trimethyl ether	168.09	52	255.5		
3251	C ₉ H ₁₂ O ₂	Pyrogallol trimethyl ether	168.09	47	241	1.009 ¹⁹	
3252	C ₉ H ₁₂ O ₂	Metaacrolein (C ₉ H ₈ O) ₂	168.09	46			
3253	C ₉ H ₁₂ O ₂	Caryophyllenic acid	168.09			1.140	
3254	C ₉ H ₁₂ O ₃ S	Mesitylenesulfonic acid	200.16	77			
3255	C ₉ H ₁₂ O ₃ S	Toluene <i>p</i> -ethylsulfonate	200.16	33	173 ¹⁵	1.174 ²²	
3256	C ₉ H ₁₂ O ₃	Anhydrocamphoronic acid	200.09	133			
3257	C ₉ H ₁₂ N	Cumidine <i>p</i> -(CH ₃) ₂ CHC ₆ H ₄ NH ₂	135.11	63	225	0.957	1333
3258	C ₉ H ₁₂ N	Dimethyl- <i>o</i> -toluidine	135.11	-61.0	184.6	0.929	682
3259	C ₉ H ₁₂ N	Dimethyl- <i>m</i> -toluidine	135.11		212.5	0.941	733
3260	C ₉ H ₁₂ N	Dimethyl- <i>p</i> -toluidine	135.11		211.5	0.937	726
3261	C ₉ H ₁₂ N	Ethyl- <i>o</i> -toluidine	135.11		214	0.953 ^{15,16}	
3262	C ₉ H ₁₂ N	Ethyl- <i>m</i> -toluidine	135.11		222		
3263	C ₉ H ₁₂ N	Ethyl- <i>p</i> -toluidine	135.11		217	0.939	
3264	C ₉ H ₁₂ N	Mesidine 1, 3, 5-(CH ₃) ₃ C ₆ H ₂ NH ₂	135.11		233	0.963	
3265	C ₉ H ₁₂ N	ω -Mesitylamine	135.11		218.2	0.950	699
3266	C ₉ H ₁₂ N	Parvoline	135.11		234		
3267	C ₉ H ₁₂ N	<i>n</i> -Propylaniline C ₉ H ₉ NHC ₃ H ₇	135.11		222	0.949 ¹⁶	
3268	C ₉ H ₁₂ N	Isopropylaniline C ₉ H ₉ NHCH(CH ₃) ₂	135.11		213		
3269	C ₉ H ₁₂ N	Pseudocumidine	135.11	66	235		
3270	C ₉ H ₁₂ NO ₂	Anhydroecgonine	167.11	235 d.			
3271	C ₉ H ₁₂ NO ₂	Adrenaline	183.11	207 d.			
3272	C ₉ H ₁₄	Apocylene	122.11	43	138.9	0.871 ⁴⁰	1056
3273	C ₉ H ₁₄	Santene	122.11		142	0.869 ¹⁵	486
3274	C ₉ H ₁₄ ClNO ₂	Anhydroecgonine hydrochloride	203.57	241			
3275	C ₉ H ₁₄ N ₂ O ₄	Ethylpropylbarbituric acid	198.12	146			
3276	C ₉ H ₁₄ O	Nopinone	138.11	0	209		
3277	C ₉ H ₁₄ O	Phorone	138.11	28	198.5	0.885	598
3278	C ₉ H ₁₄ O ₂	Laurolic acid	154.11		129 ^{11,12}		
3279	C ₉ H ₁₄ O ₂	Methyl amylpropionate	154.11		111 ¹⁸	0.991 ¹⁹	
3280	C ₉ H ₁₄ O ₂	Castelamarin	170.11	269			
3281	C ₉ H ₁₄ O ₄	<i>cis</i> -Hexahydrohomophthalic acid	186.11	146			
3282	C ₉ H ₁₄ O ₄	<i>trans</i> -Hexahydrohomophthalic acid	186.11	157			
3282.1	C ₉ H ₁₄ O ₄	<i>dl</i> -Pinic acid	186.11	102.5	210 ¹⁰	1.093 ^{109,110}	1154
3282.2	C ₉ H ₁₄ O ₄	<i>d</i> -Pinic acid	186.11	136	216 ¹⁰		
3283	C ₉ H ₁₄ O ₄	Diethyl citraconate	186.11		230.3	1.062	847
3284	C ₉ H ₁₄ O ₄	Diethyl glutaconate	186.11		238	1.050	
3285	C ₉ H ₁₄ O ₄	Diethyl itaconate	186.11		227.9	1.045	369
3286	C ₉ H ₁₄ O ₄	Diethyl mesaconate	186.11		229	1.047	594
3287	C ₉ H ₁₄ O ₄	4-Ketoazelaic acid	202.11	102; 109			
3288	C ₉ H ₁₄ O ₄	<i>L</i> -Camphoronic acid	218.11	165			
3289	C ₉ H ₁₄ O ₄	Glycerol triacetate	218.11		259	1.161	326
3290	C ₉ H ₁₄ O ₇	Trimethyl citrate	234.11	79	287 d.		
3291	C ₉ H ₁₄ NO	Pseudopelletierine	153.12	49	246	1.001 ^{99,100}	1138
3292	C ₉ H ₁₄ NO ₂	<i>d</i> -Ecgonine	185.12	257			
3293	C ₉ H ₁₄ NO ₂	<i>l</i> -Ecgonine	185.12	198 d.		1.370 ¹²¹	
3294	C ₉ H ₁₄ NO ₂	<i>dl</i> -Ecgonine	185.12	212			
3294.1	C ₉ H ₁₄ N ₂ O ₃ S	Ergothioneine	229.21	290			
3295	C ₉ H ₁₆	Campholene	124.12	> -20	133	0.803	399
3296	C ₉ H ₁₆	Nopinane	124.12		149.5	0.861 ²²	479
3297	C ₉ H ₁₆	Pulegone	124.12		139	0.791 ²²	979
3298	C ₉ H ₁₆ ClNO ₂	<i>L</i> -Ecgonine hydrochloride	221.59	246			
3299	C ₉ H ₁₆ N ₂ O ₃ S ₂	Cheiroline	328.33	48	200 d.		
3300	C ₉ H ₁₆ O	Camphorol	140.12		81 ¹⁶		
3301	C ₉ H ₁₆ O	α -Nopinol	140.12	102	205		
3302	C ₉ H ₁₆ O	<i>dl</i> -Santenol	140.12	98	196	0.987	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3303	C ₈ H ₁₆ O ₂	Amyl <i>l</i> -crotonate	156 12			0.896	360
3304	C ₈ H ₁₆ O ₂	Ethyl hexahydrobenzoate	156 12		196.5	0.967 ¹⁵	886
3305	C ₈ H ₁₆ O ₂	Methyl cyclohexylacetate	156 12		202	0.990 ¹⁴	
3306	C ₈ H ₁₆ O ₂	Ethyl isopropylacetate	172 12		205 d.	0.960 ¹⁵	
3307	C ₈ H ₁₆ O ₂	Azelaic acid HO ₂ C(CH ₂) ₇ CO ₂ H	188 12	106.5	360	1.029	1155
3308	C ₈ H ₁₆ O ₂	<i>n</i> -Butyl ethyl malonate	188 12		130 ¹²	0.976 ¹⁵	284
3309	C ₈ H ₁₆ O ₂	Isobutyl ethyl malonate	188 12		120 ⁸	0.968 ¹⁵	286
3310	C ₈ H ₁₆ O ₂	<i>sec</i> -Butyl ethyl malonate	188 12		160 ⁸⁰	0.986 ¹⁵	310
3311	C ₈ H ₁₆ O ₂	Diethyl dimethylmalonate	188 12		196	0.995	196
3312	C ₈ H ₁₆ O ₂	Diethyl glutarate CH ₃ (CH ₂ COOC ₂ H ₅) ₂	188 12		237	1.025	
3313	C ₈ H ₁₆ O ₂	Dipropyl malonate CH ₃ (CO ₂ C ₃ H ₇) ₂	188 12		228 3	1.027 ⁹	
3314	C ₈ H ₁₆ O ₂	Propyl isopropyl malonate	188 12		143 ¹²	0.980 ¹⁵	293
3314 1	C ₈ H ₁₇ BrO	<i>l</i> -Amyl bromobutyrate	221 05		105 ¹¹	1.196 ¹⁵	
3315	C ₈ H ₁₇ NO	Homotropine	155 14	85			
3316	C ₈ H ₁₇ NO	Methylpelletierine	155 14		215		
3317	C ₈ H ₁₇ NO	Triacetoneamine	155 14	39 6			
3318	C ₈ H ₁₈	Cyclononane	126 14		172	0.773 ¹⁶	
3319	C ₈ H ₁₈	Ethylcycloheptane C ₇ H ₁₅ C ₂ H ₃	126 14	< -30	199	0.952	
3320	C ₈ H ₁₈	Hexahydrocumene (CH ₃) ₂ CHC ₆ H ₁₁	126 14		150	0.787	
3321	C ₈ H ₁₈	2-Methyl-1-octene C ₈ H ₁₆ C(CH ₃)CH ₂ ..	126 14		143		
3322	C ₈ H ₁₈	Nonylene C ₈ H ₁₆ CH ₂ CHCH ₂ ..	126 14		149 9	0.754 ¹⁶	
3323	C ₈ H ₁₈	Propylcyclohexane C ₆ H ₁₁ C ₂ H ₃	126 14		149 5	0.767	
3324	C ₈ H ₁₈ O	<i>dl</i> -Pulegol	142 14		187 5	0.908	902
3325	C ₈ H ₁₈ O	Pelargonic aldehyde CH ₃ (CH ₂) ₇ CHO	142 14		93 5 ²³	0.828 ¹⁶	280
3326	C ₈ H ₁₈ O	Diisobutyl ketone [(CH ₃) ₂ CHCH ₂] ₂ CO	142 14		182	0.833	
3327	C ₈ H ₁₈ O	Isopropyl isononyl ketone	142 14		172		
3328	C ₈ H ₁₈ O ₂	Pelargonic acid CH ₃ (CH ₂) ₇ CO ₂ H	158 14	12	254	0.907	340
3329	C ₈ H ₁₈ O ₂	Amyl <i>n</i> -butyrate C ₄ H ₉ CO ₂ C ₈ H ₁₇	158 14		184 8	0.883 ⁹	184
3330	C ₈ H ₁₈ O ₂	Isononyl <i>n</i> -butyrate	158 14		178 6	0.882 ⁹	
3330 1	C ₈ H ₁₈ O ₂	<i>d</i> - β -Amyl <i>n</i> -butyrate	158 14		71 ¹⁶	0.869	161
3331	C ₈ H ₁₈ O ₂	Amyl isobutyrate (CH ₃) ₂ CHCO ₂ C ₈ H ₁₇	158 14		158	0.859	167
3332	C ₈ H ₁₈ O ₂	Butyl <i>n</i> -valerate C ₄ H ₉ CO ₂ C ₆ H ₁₃	158 14		185 8	0.885 ⁹	
3333	C ₈ H ₁₈ O ₂	Isobutyl <i>n</i> -valerate	158 14		167	0.854	
3333 1	C ₈ H ₁₈ O ₂	<i>d</i> - <i>sec</i> -Butyl valerate	158 14		67 ¹⁸	0.860	164
3334	C ₈ H ₁₈ O ₂	Isobutyl isovalerate	158 14		168 5	0.854	162
3335	C ₈ H ₁₈ O ₂	Ethyl <i>n</i> -heptylate C ₆ H ₁₃ CO ₂ C ₂ H ₅	158 14		187 1	0.872 ¹⁶	195
3336	C ₈ H ₁₈ O ₂	<i>n</i> -Heptyl acetate CH ₃ CO ₂ C ₇ H ₁₅	158 14		191 5	0.874 ¹⁶	221
3337	C ₈ H ₁₈ O ₂	Methyl caprylate C ₇ H ₁₅ CO ₂ CH ₃	158 14	-41	192 9	0.887	
3338	C ₈ H ₁₈ O ₂	<i>d</i> - β -Octylformate	158 14		82 ²⁰	0.872 ¹⁵	209
3339	C ₈ H ₁₈ O ₂	Propyl caproate C ₆ H ₁₁ CO ₂ C ₃ H ₇	158 14		185 5	0.884 ⁹	
3340	C ₈ H ₁₈ O ₂	Parapropionaldehyde (C ₃ H ₇ O) ₂	174 14		170		
3341	C ₈ H ₁₈ O ₂	Di- <i>n</i> -butyl carbonate (C ₄ H ₉ O) ₂ CO	174 14		207.7	0.924	
3342	C ₈ H ₁₈ O ₂	Diisobutyl carbonate	174 14		190.3	0.919 ¹⁶	
3343	C ₈ H ₁₈ O ₂	1, 2-Dihydroxypelargonic acid	190 14	123			
3344	C ₈ H ₁₉ O ₂	Gahetite	238 14		142		1214
3345	C ₈ H ₁₉ N	<i>l</i> -1-Methyleonane	141 15		175 5	0.832 ¹⁶	
3346	C ₈ H ₁₉ NO	<i>N</i> -Diethyl- <i>n</i> -valeramide	157 15		210		
3347	C ₈ H ₂₀	2, 4-Dimethylheptane	128 15		133.3	0.716	143
3348	C ₈ H ₂₀	<i>d</i> -2, 5-Dimethylheptane	128 15		137	0.715 ¹⁶	
3349	C ₈ H ₂₀	<i>dl</i> -2, 5-Dimethylheptane	128 15		135.9	0.719 ¹⁶	144
3350	C ₈ H ₂₀	2, 6-Dimethylheptane	128 15		132 0	0.712 ¹⁶	
3351	C ₈ H ₂₀	4-Ethylheptane (C ₃ H ₇) ₂ CHC ₂ H ₅	128 15		139	0.741	170
3352	C ₈ H ₂₀	<i>d</i> -3-Methyloctane	128 15		143.4	0.721 ¹⁷	
3353	C ₈ H ₂₀	4-Methyloctane C ₃ H ₇ (CH ₂) ₂ CHC ₂ H ₅	128 15		141 6	0.732 ¹⁶	147
3354	C ₈ H ₂₀	<i>n</i> -Nonane CH ₃ (CH ₂) ₇ CH ₃	128 15	-51	150 6	0.718	151
3355	C ₈ H ₂₀ O	Butyl- <i>sec</i> -butyl carbinol	144 15		180	0.834	335
3356	C ₈ H ₂₀ O	Dibutyl carbinol (C ₄ H ₉) ₂ CHOH	144 15		194	0.823	320
3357	C ₈ H ₂₀ O	Diisobutyl carbinol	144 15		174 3	0.816 ¹⁷	271
3358	C ₈ H ₂₀ O	Di- <i>sec</i> -butyl carbinol	144 15		171	0.836	338
3359	C ₈ H ₂₀ O	Diethylisobutyl carbinol	144 15		172		
3360	C ₈ H ₂₀ O	4, 6-Dimethylheptane-2-ol	144 15		195	0.870 ⁹	
3361	C ₈ H ₂₀ O	Methylethylisooamyl carbinol	144 15		175	0.829	329
3362	C ₈ H ₂₀ O	Methylethyl- <i>tert</i> -amyl carbinol	144 15		166	0.832	348

No.	Formula	Name	Mol. wt.	M P	B. P.	<i>d</i>	R. I. No.
3363	C ₉ H ₂₀ O	Methylpropylisobutyl carbinol	144 15		171 3	0 826	330
3364	C ₉ H ₂₀ O	<i>n</i> -Nonyl alcohol CH ₃ (CH ₂) ₈ OH	144 15	-5	215	0 828	344
3365	C ₉ H ₂₀ O	Isobutyl- <i>d</i> -amyl ether	144 15		148 2	0 773	125
3366	C ₉ H ₂₀ O	Ethyl <i>n</i> -heptyl ether C ₂ H ₅ OC ₇ H ₁₅	144 15		166 6	0 790 ¹⁸	
3367	C ₉ H ₂₀ O	Methyl <i>n</i> -octyl ether CH ₃ OC ₈ H ₁₇	144 15		173	0 802 ¹⁸	
3368	C ₉ H ₂₀ O ₂	Propylidene dipropyl ether	136 15		166 2	0 849 ⁰	
3369	C ₉ H ₂₀ O ₄	Ethyl orthocarbonate C(OC ₂ H ₅) ₄	192 15		159	0 917	90
3370	C ₉ H ₁₀ O ₈ S ₂	Tetronal (C ₇ H ₅) ₂ C(SO ₃ C ₂ H ₅) ₂	256 28	85			
3371	C ₉ H ₂₁ N	<i>n</i> -Nonylamine C ₉ H ₁₉ NH ₂	143 17		195		
3372	C ₉ H ₂₁ N	Tri- <i>n</i> -propylamine (C ₃ H ₇) ₃ N	143 17	-93 5	156	0 757	230
3373	C ₁₀ H ₈ Cl ₂	Hexachloronaphthalene	334 76	143			
3374	C ₁₀ H ₆ Cl ₄	α -Tetrachloronaphthalene	265 86	130			
3375	C ₁₀ H ₆ Cl ₄	β -Tetrachloronaphthalene	265 86	194			
3376	C ₁₀ H ₆ Cl ₄	γ -Tetrachloronaphthalene	265 86	176			
3377	C ₁₀ H ₆ Cl ₄	δ -Tetrachloronaphthalene	265 86	141			
3378	C ₁₀ H ₆ Cl ₄	ϵ -Tetrachloronaphthalene	265 86	180			
3379	C ₁₀ H ₆ Cl ₄	ζ -Tetrachloronaphthalene	265 86	160 5			
3380	C ₁₀ H ₆ Cl ₄	<i>vic.</i> -Tetrachloronaphthalene	265 86	140			
3381	C ₁₀ H ₄ N ₄ O ₈	α -Tetranitronaphthalene	308 06	259	exp.		
3382	C ₁₀ H ₄ N ₄ O ₈	1, 2, 5, 8-Tetranitronaphthalene	308 06	270 d.			
3383	C ₁₀ H ₄ N ₄ O ₈	1, 2, 6, 8-Tetranitronaphthalene	308 06	<300			
3384	C ₁₀ H ₄ N ₄ O ₈	1, 3, 5, 8-Tetranitronaphthalene	308 06	195			
3385	C ₁₀ H ₄ N ₄ O ₈	1, 3, 6, 8-Tetranitronaphthalene	308 06	203	exp.		
3386	C ₁₀ H ₄ N ₄ O ₈	2, 4, 5, 7-Tetranitro- α -naphthol	324 06	180			
3387	C ₁₀ H ₆ Cl ₃	1, 2, 3-Trichloronaphthalene	231 41	81			
3388	C ₁₀ H ₆ Cl ₃	1, 2, 4-Trichloronaphthalene	231 41	92			
3389	C ₁₀ H ₆ Cl ₃	1, 2, 5-Trichloronaphthalene	231 41	78			
3390	C ₁₀ H ₆ Cl ₃	1, 2, 6-Trichloronaphthalene	231 41	97			
3391	C ₁₀ H ₆ Cl ₃	1, 2, 7-Trichloronaphthalene	231 41	88			
3392	C ₁₀ H ₆ Cl ₃	1, 2, 8-Trichloronaphthalene	231 41	83 5			
3393	C ₁₀ H ₆ Cl ₃	1, 3, 5-Trichloronaphthalene	231 41	103			
3394	C ₁₀ H ₆ Cl ₃	1, 3, 6-Trichloronaphthalene	231 41	80 5			
3395	C ₁₀ H ₆ Cl ₃	1, 3, 7-Trichloronaphthalene	231 41	113			
3396	C ₁₀ H ₆ Cl ₃	1, 3, 8-Trichloronaphthalene	231 41	89 5			
3397	C ₁₀ H ₆ Cl ₃	1, 4, 5-Trichloronaphthalene	231 41	131			
3398	C ₁₀ H ₆ Cl ₃	1, 4, 6-Trichloronaphthalene	231 41	66			
3399	C ₁₀ H ₆ Cl ₃	1, 6, 7-Trichloronaphthalene	231 41	109 5			
3400	C ₁₀ H ₆ Cl ₃	2, 3, 6-Trichloronaphthalene	231 41	91			
3401	C ₁₀ H ₆ Cl ₃	2, 3, 7-Trichloronaphthalene	231 41	90			
3402	C ₁₀ H ₆ NO ₁₀	Pyridinepentacarboxylic acid	299 05	220 d.			
3403	C ₁₀ H ₄ N ₃ O ₆	1, 2, 5-Trinitronaphthalene	263 06	113			
3404	C ₁₀ H ₄ N ₃ O ₆	1, 3, 5-Trinitronaphthalene	263 06	123			
3405	C ₁₀ H ₄ N ₃ O ₆	1, 3, 8-Trinitronaphthalene	263 06	218			
3406	C ₁₀ H ₄ N ₃ O ₆	1, 4, 5-Trinitronaphthalene	263 06	247			
3407	C ₁₀ H ₄ N ₃ O ₇	2, 4, 5-Trinitro- α -naphthol	279 06	189 5			
3408	C ₁₀ H ₄ N ₃ O ₇	2, 4, 7-Trinitro- α -naphthol	279 06	145			
3409	C ₁₀ H ₄ N ₃ O ₇	2, 4, 8-Trinitro- α -naphthol	279 06	175			
3410	C ₁₀ H ₆ ClNO ₂	4-Chloro-1-nitronaphthalene	207 51	84			
3411	C ₁₀ H ₆ ClNO ₂	7-Chloro-1-nitronaphthalene	207 51	116			
3412	C ₁₀ H ₆ Cl ₂	1, 2-Dichloronaphthalene	196 96	37	282	1 315 ¹⁸	1076
3413	C ₁₀ H ₆ Cl ₂	1, 3-Dichloronaphthalene	196 96	61	280		
3414	C ₁₀ H ₆ Cl ₂	1, 4-Dichloronaphthalene	196 96	68	287 6	1 300 ¹⁸	1104
3415	C ₁₀ H ₆ Cl ₂	1, 5-Dichloronaphthalene	196 96	107			
3416	C ₁₀ H ₆ Cl ₂	1, 6-Dichloronaphthalene	196 96	48			
3417	C ₁₀ H ₆ Cl ₂	1, 7-Dichloronaphthalene	196 96	62	286	1 261 ¹⁰⁰	1149
3418	C ₁₀ H ₆ Cl ₂	1, 8-Dichloronaphthalene	196 96	88	d.	1 292 ¹⁰⁰	1150
3419	C ₁₀ H ₆ Cl ₂	2, 3-Dichloronaphthalene	196 96	120			
3420	C ₁₀ H ₆ Cl ₂	2, 6-Dichloronaphthalene	196 96	135	285		
3421	C ₁₀ H ₆ Cl ₂	2, 7-Dichloronaphthalene	196 96	114			
3422	C ₁₀ H ₆ Cl ₂ O	2, 3-Dichloro- α -naphthol	212 96	101			
3423	C ₁₀ H ₆ Cl ₂ O	2, 4-Dichloro- α -naphthol	212 96	108			
3424	C ₁₀ H ₆ Cl ₂ O	5, 7-Dichloro- α -naphthol	212 96	132			
3425	C ₁₀ H ₆ Cl ₂ O	5, 8-Dichloro- α -naphthol	212 96	115			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3426	$C_{10}H_6Cl_2O$	6, 7-Dichloro- α -naphthol	212.96	151			
3427	$C_{10}H_6Cl_2O$	7, 8-Dichloro- α -naphthol	212.96	95			
3428	$C_{10}H_6Cl_2O$	1, 3-Dichloro- β -naphthol	212.96	81			
3429	$C_{10}H_6Cl_2O$	1, 4-Dichloro- β -naphthol	212.96	124			
3429 1	$C_{10}H_6Cl_2O$	3, 6-(6, 8)-Dichloro- β -naphthol	212.96	125			
3430	$C_{10}H_4Cl_2O_2S_2$	Naphthalene-1, 5-disulfonechloride	325.09	183			
3431	$C_{10}H_4Cl_2O_2S_2$	Naphthalene-1, 6-disulfonechloride	325.09	129			
3432	$C_{10}H_4Cl_2O_2S_2$	Naphthalene-2, 6-disulfonechloride	325.09	226			
3433	$C_{10}H_4Cl_2O_2S_2$	Naphthalene-2, 7-disulfonechloride	325.09	162			
3434	$C_{10}H_8N_2O_4$	Pyrocoll	186.06	269			
3435	$C_{10}H_8N_2O_4$	1, 2-Dinitronaphthalene	218.06	103			
3436	$C_{10}H_8N_2O_4$	1, 3-Dinitronaphthalene	218.06	145			
3437	$C_{10}H_8N_2O_4$	1, 4-Dinitronaphthalene	218.06	129			
3438	$C_{10}H_8N_2O_4$	1, 5-Dinitronaphthalene	218.06	216			
3439	$C_{10}H_8N_2O_4$	1, 6-Dinitronaphthalene	218.06	162			
3440	$C_{10}H_8N_2O_4$	1, 7-Dinitronaphthalene	218.06	156			
3441	$C_{10}H_8N_2O_4$	1, 8-Dinitronaphthalene	218.06	170			
3442	$C_{10}H_8N_2O_4$	2, 4-Dinitro- α -naphthol	234.06	138			
3443	$C_{10}H_8N_2O_4$	4, 5-Dinitro- α -naphthol	234.06	230 d.			
3444	$C_{10}H_8N_2O_4$	4, 8-Dinitro- α -naphthol	234.06	235 d.			
3445	$C_{10}H_8N_2O_4$	1, 6-Dinitro- β -naphthol	234.06	195			
3446	$C_{10}H_8N_2O_4$	1, 8-Dinitro- β -naphthol	234.06	198			
3447	$C_{10}H_6O_2$	1, 2-Naphthoquinone	158.05	120 d.			
3448	$C_{10}H_6O_2$	1, 4-Naphthoquinone	158.05	125			
3449	$C_{10}H_6O_2$	2, 6-Naphthoquinone	158.05	135			
3450	$C_{10}H_8O_4$	Mellophanic acid	254.05	238			
3451	$C_{10}H_8O_4$	Prehnitic acid	254.05	237 d.			
3452	$C_{10}H_8O_4$	Pyromellitic acid	254.05	264			
3453	$C_{10}H_7Br$	α -Bromonaphthalene	206.97	5	281.1	1.476	799
3454	$C_{10}H_7Br$	β -Bromonaphthalene	206.97	59	282	1.605 ⁹	
3455	$C_{10}H_7Cl$	α -Chloronaphthalene	162.51		258	1.191	795
3456	$C_{10}H_7Cl$	β -Chloronaphthalene	162.51	56	264.3	1.138 ^{10,7}	1102
3457	$C_{10}H_7ClO$	2-Chloro- α -naphthol	178.51	70			
3458	$C_{10}H_7ClO$	4-Chloro- α -naphthol	178.51	117			
3459	$C_{10}H_7ClO$	5-Chloro- α -naphthol	178.51	131.5			
3460	$C_{10}H_7ClO$	6-Chloro- α -naphthol	178.51	94			
3461	$C_{10}H_7ClO$	7-Chloro- α -naphthol	178.51	123			
3462	$C_{10}H_7ClO$	1-Chloro- β -naphthol	178.51	71			
3463	$C_{10}H_7ClO$	5-Chloro- β -naphthol	178.51	128			
3464	$C_{10}H_7ClO$	6-Chloro- β -naphthol	178.51	115			
3465	$C_{10}H_7ClO$	7-Chloro- β -naphthol	178.51	126.5			
3466	$C_{10}H_7ClO$	8-Chloro- β -naphthol	178.51	101	308		
3467	$C_{10}H_7ClO_2S$	Naphthalene-1-sulfonechloride	226.58	68	195 ¹²		
3468	$C_{10}H_7ClO_2S$	Naphthalene-2-sulfonechloride	226.58	76	201 ¹³		
3469	$C_{10}H_7F$	α -Fluoronaphthalene	146.05		216.5	1.135 ⁹	
3470	$C_{10}H_7F$	β -Fluoronaphthalene	146.05	59	212.5		
3471	$C_{10}H_7IO$	1-Iodo- β -naphthol	269.99	94.5			
3472	$C_{10}H_7NO$	Cinnamyl cyanide $C_6H_5CH:CH_2COCN$	157.06	115			
3473	$C_{10}H_7NO_2$	α -Nitronaphthalene	173.06	58.8	304	1.331 ⁴	
3474	$C_{10}H_7NO_2$	β -Nitronaphthalene	173.06	79	165 ¹⁴		
3475	$C_{10}H_7NO_2$	2-Nitroso- α -naphthol	173.06	152			
3476	$C_{10}H_7NO_2$	4-Nitroso- α -naphthol	173.06	194			
3477	$C_{10}H_7NO_2$	1-Nitroso- β -naphthol	173.06	109.5			
3478	$C_{10}H_7NO_2$	Cinchoninic acid	173.06	254			
3479	$C_{10}H_7NO_2$	Quinaldinic acid	173.06	156			
3480	$C_{10}H_7NO_2$	Quinoline-3-carboxylic acid	173.06	275			
3481	$C_{10}H_7NO_2$	Quinoline-6-carboxylic acid	173.06	292			
3482	$C_{10}H_7NO_2$	Quinoline-7-carboxylic acid	173.06	249			
3483	$C_{10}H_7NO_2$	Quinoline-8-carboxylic acid	173.06	187.5			
3484	$C_{10}H_7NO_2$	α -Kynurenic acid	189.06	283			
3485	$C_{10}H_7NO_2$	2-Nitro- α -naphthol	189.06	128			
3486	$C_{10}H_7NO_2$	3-Nitro- α -naphthol	189.06	168			
3487	$C_{10}H_7NO_2$	4-Nitro- α -naphthol	189.06	164			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3488	C ₁₀ H ₇ NO ₂	5-Nitro- α -naphthol.	189.06	171			
3489	C ₁₀ H ₇ NO ₂	1-Nitro- β -naphthol.	189.06	103			
3490	C ₁₀ H ₇ NO ₂	5-Nitro- β -naphthol.	189.06	147			
3491	C ₁₀ H ₇ NO ₂	6-Nitro- β -naphthol.	189.06	158			
3492	C ₁₀ H ₇ NO ₂	8-Nitro- β -naphthol.	189.06	145			
3493	C ₁₀ H ₇ NO ₄	Indolecarboxylic acid.	205.06	>250 d			
3494	C ₁₀ H ₈	Naphthalene C ₁₀ H ₈	128.06	80.1	217.0	1.145	1143
3495	C ₁₀ H ₈ Cl ₄	Naphthalenetetrachloride	269.89	182			
3496	C ₁₀ H ₁₀ N	Quinoline methiodide C ₁₀ H ₇ N·CH ₃ I	271.02	133			
3497	C ₁₀ H ₈ N ₂	2, 3'-Dipyridyl.	156.08		289		
3498	C ₁₀ H ₈ N ₂	3, 3'-Dipyridyl	156.08	68	290.5	1.164	
3499	C ₁₀ H ₈ N ₂	4, 4'-Dipyridyl	156.08	112	304.8		
3500	C ₁₀ H ₈ N ₂	Nicotelline	156.08	148	<300		
3501	C ₁₀ H ₈ N ₂ O ₂	3-Nitro- α -naphthylamine	188.08	137			
3502	C ₁₀ H ₈ N ₂ O ₂	6-Nitro- α -naphthylamine	188.08	143			
3503	C ₁₀ H ₈ N ₂ O ₂	7-Nitro- α -naphthylamine	188.08	122			
3504	C ₁₀ H ₈ N ₂ O ₂	1-Nitro- β -naphthylamine	188.08	127			
3505	C ₁₀ H ₈ N ₂ O ₂	5-Nitro- β -naphthylamine	188.08	113			
3506	C ₁₀ H ₈ N ₂ O ₂	8-Nitro- β -naphthylamine	188.08	105			
3507	C ₁₀ H ₈ O	α -Naphthol C ₁₀ H ₇ OH	144.06	96	280	1.099 ⁹⁹	1126
3508	C ₁₀ H ₈ O	β -Naphthol C ₁₀ H ₇ OH	144.06	122	286	1.217 ⁴	1333
3509	C ₁₀ H ₈ O ₂	1, 2-Dihydroxynaphthalene	160.06	60			
3510	C ₁₀ H ₈ O ₂	1, 3-Dihydroxynaphthalene	160.06	125			
3511	C ₁₀ H ₈ O ₂	1, 4-Dihydroxynaphthalene	160.06	176			
3512	C ₁₀ H ₈ O ₂	1, 5-Dihydroxynaphthalene	160.06	258			
3513	C ₁₀ H ₈ O ₂	1, 6-Dihydroxynaphthalene	160.06	138			
3514	C ₁₀ H ₈ O ₂	1, 7-Dihydroxynaphthalene	160.06	178			
3515	C ₁₀ H ₈ O ₂	1, 8-Dihydroxynaphthalene	160.06	140			
3516	C ₁₀ H ₈ O ₂	2, 3-Dihydroxynaphthalene	160.06	159			
3517	C ₁₀ H ₈ O ₂	2, 6-Dihydroxynaphthalene	160.06	216			
3518	C ₁₀ H ₈ O ₂	2, 7-Dihydroxynaphthalene	160.06	190			
3519	C ₁₀ H ₈ O ₂ S	Naphthalene-1-sulfonic acid	192.13	85			
3520	C ₁₀ H ₈ O ₂ S	Naphthalene-2-sulfonic acid	192.13	105			
3521	C ₁₀ H ₈ O ₃	1, 4, 5-Trihydroxynaphthalene	176.06	170			
3522	C ₁₀ H ₈ O ₃	1, 3, 6-Trihydroxynaphthalene	176.06	97			
3523	C ₁₀ H ₈ O ₃	2-Benzoylacrylic acid.	176.06	99			
3524	C ₁₀ H ₈ O ₃ S	Naphthalene-1-sulfonic acid	208.13	90			
3525	C ₁₀ H ₈ O ₃ S	Naphthalene-2-sulfonic acid	208.13	102			
3526	C ₁₀ H ₈ O ₄	Anemonin	192.06	189 s. d.	300 d.		
3527	C ₁₀ H ₈ O ₄	<i>o</i> -Carboxycinnamic acid	192.06	175			
3528	C ₁₀ H ₈ O ₄	Furoin	192.06	135			
3529	C ₁₀ H ₈ O ₄	β -Methylesculetin	192.06	204			
3530	C ₁₀ H ₈ O ₄	Scopoletin	192.06	204			
3531	C ₁₀ H ₈ O ₄	1, 4, 5, 6-Tetrahydroxynaphthalene	192.06	154			
3532	C ₁₀ H ₈ O ₄ S	α -Naphthol-2-sulfonic acid	224.13	<250			
3533	C ₁₀ H ₈ O ₄ S	α -Naphthol-4-sulfonic acid	224.13	170 d.			
3534	C ₁₀ H ₈ O ₄ S	α -Naphthol-5-sulfonic acid	224.13	120			
3535	C ₁₀ H ₈ O ₄ S	α -Naphthol-8-sulfonic acid	224.13	107			
3536	C ₁₀ H ₈ O ₄ S	β -Naphthol-6-sulfonic acid	224.13	125			
3537	C ₁₀ H ₈ O ₄ S	β -Naphthol-7-sulfonic acid	224.13	89			
3538	C ₁₀ H ₈ O ₅	Fraxetin.	208.06	227			
3539	C ₁₀ H ₈ O ₆ S ₂	Naphthalene-1, 5-disulfonic acid	288.19	d.			1303
3540	C ₁₀ H ₈ O ₆ S ₂	Naphthalene-1, 6-disulfonic acid	288.19	125 d.			1271
3541	C ₁₀ H ₈ O ₇	Cotarnic acid.	240.06	178			
3542	C ₁₀ H ₈ S	α -Thionaphthol C ₁₀ H ₇ SH	160.13		285 d.	1.146 ⁹⁹	
3543	C ₁₀ H ₈ S	β -Thionaphthol C ₁₀ H ₇ SH	160.13	81	288 s. d.	1.550	
3544	C ₁₀ H ₇ Cl ₃ O ₂	Chloralacetophenone.	267.44	77			
3545	C ₁₀ H ₉ N	3-Methylquinoline.	143.08	14	250	1.074	
3546	C ₁₀ H ₉ N	4-Methylquinoline (Lepidine)	143.08		202	1.086	
3547	C ₁₀ H ₉ N	6-Methylquinoline.	143.08		255	1.066	1003
3548	C ₁₀ H ₉ N	7-Methylquinoline.	143.08		252.5	1.072	788
3549	C ₁₀ H ₉ N	8-Methylquinoline.	143.08		143 ⁹⁹	1.073	789
3550	C ₁₀ H ₉ N	α -Naphthylamine C ₁₀ H ₇ NH ₂	143.08	50	301	1.131	1080

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3551	C ₁₀ H ₇ N	<i>β</i> -Naphthylamine C ₁₀ H ₇ NH ₂	143 08	110 2	306.1	1.061 ⁸⁰ ₄	
3552	C ₁₀ H ₅ NO	3-Amino- <i>β</i> -naphthol	159 08	234			
3553	C ₁₀ H ₅ NO	7-Amino- <i>β</i> -naphthol	159 08	163			
3554	C ₁₀ H ₅ NO	2-Hydroxyquinaldine	159 08	205			
3555	C ₁₀ H ₅ NO	4-Hydroxyquinaldine	159 08	231			
3556	C ₁₀ H ₅ NO	6-Hydroxyquinaldine	159 08	213			
3557	C ₁₀ H ₅ NO	7-Hydroxyquinaldine	159 08	234			
3558	C ₁₀ H ₅ NO	8-Hydroxyquinaldine	159 08	74	267		
3559	C ₁₀ H ₅ NO	Echinopane	159 08	152			
3560	C ₁₀ H ₅ N ₂ O ₂	<i>α</i> -Santalocarboxylic acid	175 08	165			
3572	C ₁₀ H ₅ N ₂ O ₄	Amalloxan	235 09	248 d.			
3573	C ₁₀ H ₁₀	1, 2-Dihydronaphthalene	130 08	-9	84.5 ¹⁵	0.997	
3574	C ₁₀ H ₁₀	1, 4-Dihydronaphthalene	130 08	15 5	212	0.998	844
3575	C ₁₀ H ₁₀	1-Ethyl-2-phenylacetylene	130 08		203	0.923	
3576	C ₁₀ H ₁₀	Phenylcrotonylene C ₆ H ₅ CH=CHC ₂ H ₅	130 08		190		
3578	C ₁₀ H ₁₀ Cl ₂ NO ₂	Chloral- <i>p</i> -acetaminophenol	298 46	160 d.			
3579	C ₁₀ H ₁₀ NO ₄	Oxycannabin	208 09	182			
3580	C ₁₀ H ₁₀ N ₂	Naphthylene-1, 2-diamine	158 09	96			
3581	C ₁₀ H ₁₀ N ₂	Naphthylene-1, 4-diamine	158 09	120			
3582	C ₁₀ H ₁₀ N ₂	Naphthylene-1, 5-diamine	158 09	189 5			
3583	C ₁₀ H ₁₀ N ₂	1, 6-Naphthylenediamine	158 09	77 5		1.147 ⁸⁹ ₄	1137
3584	C ₁₀ H ₁₀ N ₂	1, 8-Naphthylenediamine	158 09	66 5		1.127 ⁸⁹ ₄	1135
3585	C ₁₀ H ₁₀ N ₂ O	<i>N</i> -Phenyl-3-methylpyrazolone	174 09	127	191 ¹⁷		1287
3586	C ₁₀ H ₁₀ N ₂ O ₂ S	<i>N</i> -Sulphophenyl-3-methylpyrazolone	254 16	320 d.			
3587	C ₁₀ H ₁₀ O	Benzylidenacetone	146 08	42	262	1.008	1068
3588	C ₁₀ H ₁₀ O	1, 2-Dihydro- <i>β</i> -naphthol	146 08	35	164 ²⁸		
3589	C ₁₀ H ₁₀ O ₄	<i>cis</i> -Isosafrol	162 08	> -18	243	1.117 ¹⁵ ₄	868
3590	C ₁₀ H ₁₀ O ₄	<i>trans</i> -Isosafrol	162 08		248	1.123 ¹⁵ ₄	869
3591	C ₁₀ H ₁₀ O ₄	Safrol C ₆ H ₄ (O ₂ C ₂ H ₅) ₂	162 08	11	234 5	1.096	812
3592	C ₁₀ H ₁₀ O ₄	Benzoylpropionaldehyde	162 08		244 4	0.998 ¹⁵	
3593	C ₁₀ H ₁₀ O ₄	Benzoylacetone C ₆ H ₅ COCH ₂ COCH ₃	162 08	61	262	1.090 ⁶⁰	1106
3594	C ₁₀ H ₁₀ O ₄	1-Benzylacrylic acid CH ₂ =C(C ₆ H ₅)CO ₂ H	162 08	69			
3595	C ₁₀ H ₁₀ O ₄	1-Benzylidenepropionic acid	162 08	74	288		
3596	C ₁₀ H ₁₀ O ₄	2-Benzylidenepropionic acid	162 08	86	302		
3597	C ₁₀ H ₁₀ O ₄	3-Phenylcrotonic acid	162 08	65			
3598	C ₁₀ H ₁₀ O ₄	Allyl benzoate C ₆ H ₅ CO ₂ C ₃ H ₅	162 08		230	1.058 ¹⁵ ₄	
3599	C ₁₀ H ₁₀ O ₄	Benzyl acrylate C ₆ H ₅ CO ₂ CH ₂ C ₃ H ₅	162 08		110 ⁸	1.069 ⁸ ₄	
3600	C ₁₀ H ₁₀ O ₄	Methyl cinnamate	162 08	36	259 6	1.042 ¹⁰ ₅	973
3601	C ₁₀ H ₁₀ O ₄	Phenylvinyl acetate	162 08		121 ¹⁰	1.065	999
3602	C ₁₀ H ₁₀ O ₄	<i>o</i> -Comferylaldehyde	178 08	131			
3603	C ₁₀ H ₁₀ O ₄	<i>p</i> -Comferylaldehyde	178 08	82 5			
3604	C ₁₀ H ₁₀ O ₄	<i>m</i> -Methoxycinnamic acid	178 08	115			
3605	C ₁₀ H ₁₀ O ₄	<i>p</i> -Methoxycinnamic acid	178 08	169			
3606	C ₁₀ H ₁₀ O ₄	Methyl benzoylacetate	178 08		265 d.	1.158	712
3607	C ₁₀ H ₁₀ O ₄	1-Benzoylactic acid	194 08	112			
3608	C ₁₀ H ₁₀ O ₄	Benzylmalonic acid	194 08	117			
3609	C ₁₀ H ₁₀ O ₄	Ferulic acid	194 08	169			
3610	C ₁₀ H ₁₀ O ₄	Hesperetinic acid	194 08	228			
3611	C ₁₀ H ₁₀ O ₄	<i>o</i> -Phenylenediacetic acid	194 08	150			
3612	C ₁₀ H ₁₀ O ₄	<i>m</i> -Phenylenediacetic acid	194 08	170			
3613	C ₁₀ H ₁₀ O ₄	<i>p</i> -Phenylenediacetic acid	194 08	241			
3614	C ₁₀ H ₁₀ O ₄	Dimethyl isophthalate	194 08	68			
3615	C ₁₀ H ₁₀ O ₄	Dimethyl <i>o</i> -phthalate	194 08		282	1.189 ²⁵ ₅	
3616	C ₁₀ H ₁₀ O ₄	Dimethyl terephthalate	194 08	140	>300		
3617	C ₁₀ H ₁₀ O ₄	Ethyl hydrogen <i>o</i> -phthalate	194 08	48			
3618	C ₁₀ H ₁₀ O ₄	Hydroquinone diacetate	194 08	124			
3619	C ₁₀ H ₁₀ O ₄	Methyl acetylsalicylate	194 08	54			
3620	C ₁₀ H ₁₀ O ₄	Resorcinol diacetate	194 08		278 s. d.		
3621	C ₁₀ H ₁₀ O ₄	Meconin	194 08	101	155		
3622	C ₁₀ H ₁₀ O ₄	Salacetol <i>o</i> -HOOC ₆ H ₄ CO ₂ CH ₂ COCH ₃	194 08	71			
3623	C ₁₀ H ₁₀ O ₄	Larixmic acid	210 08	153			
3624	C ₁₀ H ₁₀ O ₄	Opianic acid	210 08	150			1333
3625	C ₁₀ H ₁₀ O ₄	Apolic acid	226 08	175			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3626	C ₁₀ H ₁₀ O ₄	Hemipinic acid	226.08	186			
3627	C ₁₀ H ₁₁ NO ₂	Acetoacetanilide	177.09	85			
3628	C ₁₀ H ₁₁ NO ₂	Diacetanilide (CH ₃ CO) ₂ N.C ₆ H ₅	177.09	37	142 ¹¹		
3629	C ₁₀ H ₁₁ NO ₂	<i>p</i> -Diacetylaminophenol	193.09	118			
3630	C ₁₀ H ₁₁ NO ₂	Ethyl oxanilate	193.09	67	300		
3631	C ₁₀ H ₁₁ NO ₂	Methyl hippurate	193.09	80.5			
3632	C ₁₀ H ₁₁ NO ₂	<i>dl</i> -Benzoylalanine	193.09	166			
3635	C ₁₀ H ₁₁ NO ₄	Benzacetin	209.09	205			
3636	C ₁₀ H ₁₁ N ₂ O ₄	4-Nitro-1, 3-diacetylphenylenediamine	237.11	246			
3637	C ₁₀ H ₁₂	1, 2, 3, 4-Tetrahydronaphthalene	132.09		207.2	0.971	931
3638	C ₁₀ H ₁₂	5, 6, 7, 8-Tetrahydronaphthalene	132.09	-30	207	0.975	930
3639	C ₁₀ H ₁₂	β -Phenyl- β -butylene	132.09		189	0.901 ²¹	966
3640	C ₁₀ H ₁₂ Br ₂ O	2, 4-Dibromothymol	307.92	4	175 ¹⁸	1.659 ^{17, 4}	
3641	C ₁₀ H ₁₂ Br ₂ O ₂	Isoeugenol-1, 2-dibromide	323.92	102			
3642	C ₁₀ H ₁₂ N ₂	Isonicotine	160.11		203	1.098	760
3643	C ₁₀ H ₁₂ N ₂	Nicotine	160.11		267	1.078 ¹²	
3643 1	C ₁₀ H ₁₂ N ₂ O	1-Allyl-2-phenylurea	176.11	115.5			
3644	C ₁₀ H ₁₂ N ₂ O ₂	Diacetyl- <i>o</i> -phenylenediamine	192.11	186			
3645	C ₁₀ H ₁₂ N ₂ O ₂	Diacetyl- <i>m</i> -phenylenediamine	192.11	191			
3646	C ₁₀ H ₁₂ N ₂ O ₂	Diacetyl- <i>p</i> -phenylenediamine	192.11	160			
3647	C ₁₀ H ₁₂ N ₂ O ₄	5, 5-Diallylbarbituric acid	208.11	171			
3648	C ₁₀ H ₁₂ O	<i>p</i> -Anethol <i>p</i> -C ₆ H ₄ OC ₆ H ₄ CH ₂ CHCH ₃	148.09	22.5	235.3	0.986	1044
3649	C ₁₀ H ₁₂ O	1, 2, 3, 4-Tetrahydro- α -naphthol	148.09		140 ¹⁷	1.090	917
3650	C ₁₀ H ₁₂ O	5, 6, 7, 8-Tetrahydro- α -naphthol	148.09	68	265.3		
3651	C ₁₀ H ₁₂ O	1, 2, 3, 4-Tetrahydro- β -naphthol	148.09		265.5	1.071	
3652	C ₁₀ H ₁₂ O	5, 6, 7, 8-Tetrahydro- β -naphthol	148.09	57.5	276		
3653	C ₁₀ H ₁₂ O	Benzyl allyl ether C ₆ H ₅ CH ₂ OC ₃ H ₇	148.09		204		
3654	C ₁₀ H ₁₂ O	Ethyl styryl ether C ₆ H ₅ CH ₂ CHOC ₂ H ₅	148.09		226	0.982	803
3655	C ₁₀ H ₁₂ O	Methyl chavicyl ether	148.09		216	0.965	676
3656	C ₁₀ H ₁₂ O	Cumic aldehyde (CH ₃) ₂ CHC ₆ H ₄ CHO	148.09		235	0.978	698
3657	C ₁₀ H ₁₂ O	Mesitylvinic aldehyde	148.09		237		
3658	C ₁₀ H ₁₂ O	3, 4, 5-Trimethylbenzaldehyde	148.09	52			
3659	C ₁₀ H ₁₂ O	Benzyl acetone C ₆ H ₅ (CH ₂) ₂ COC ₂ H ₅	148.09		236	0.980 ¹⁴	
3660	C ₁₀ H ₁₂ O	Ethyl benzyl ketone	148.09		230.2	1.002 ²	
3661	C ₁₀ H ₁₂ O	Phenyl isopropyl ketone	148.09		217	0.984	879
3662	C ₁₀ H ₁₂ O	Phenyl <i>n</i> -propyl ketone	148.09	11	232.3	0.988	
3663	C ₁₀ H ₁₂ O	<i>p</i> -Tolylacetone	148.09	51	233		
3664	C ₁₀ H ₁₂ O	<i>p</i> -Tolyl ethyl ketone	148.09		239 ⁷⁸³	0.993	690
3665	C ₁₀ H ₁₂ O ₂	3, 5, 6-Trimethyl-2-hydroxybenzaldehyde	164.09	106			
3666	C ₁₀ H ₁₂ O ₂	Eugenol	164.09		253	1.071 ¹²	841
3667	C ₁₀ H ₁₂ O ₂	Isoeugenol	164.09	-10	267.5	1.080	936
3668	C ₁₀ H ₁₂ O ₂	Cumic acid (CH ₃) ₂ CHC ₆ H ₄ CO ₂ H	164.09	116.5		1.163 ⁴	
3669	C ₁₀ H ₁₂ O ₂	<i>o</i> -Isopropylbenzoic acid	164.09	51			
3670	C ₁₀ H ₁₂ O ₂	3-Phenylbutyric acid C ₆ H ₅ (CH ₂) ₃ CO ₂ H	164.09	47.5	200		
3671	C ₁₀ H ₁₂ O ₂	<i>o</i> -Propylbenzoic acid <i>o</i> -C ₆ H ₄ (C ₃ H ₇)CO ₂ H	164.09	58	273		
3672	C ₁₀ H ₁₂ O ₂	<i>p</i> -Propylbenzoic acid	164.09	141			
3673	C ₁₀ H ₁₂ O ₂	3, 4, 5-Trimethylbenzoic acid	164.06	215			
3674	C ₁₀ H ₁₂ O ₂	2, 4, 5-Trimethylbenzoic acid	164.09	149.5			
3675	C ₁₀ H ₁₂ O ₂	2, 4, 6-Trimethylbenzoic acid	164.09	152			
3676	C ₁₀ H ₁₂ O ₂	Benzyl propionate	164.09		220	1.036 ^{17, 5}	
3677	C ₁₀ H ₁₂ O ₂	Ethyl phenylacetate C ₆ H ₅ CH ₂ CO ₂ C ₂ H ₅	164.09		226	1.031	589
3678	C ₁₀ H ₁₂ O ₂	Ethyl <i>o</i> -toluate CH ₃ C ₆ H ₄ CO ₂ C ₂ H ₅	164.09		221.3	1.033	629
3679	C ₁₀ H ₁₂ O ₂	Ethyl <i>m</i> -toluate CH ₃ C ₆ H ₄ CO ₂ C ₂ H ₅	164.09		226.4	1.028	624
3680	C ₁₀ H ₁₂ O ₂	Ethyl <i>p</i> -toluate CH ₃ C ₆ H ₄ CO ₂ C ₂ H ₅	164.09		228	1.026	636
3681	C ₁₀ H ₁₂ O ₂	Isopropyl benzoate	164.09		218.5	1.017 ¹¹	
3681.1	C ₁₀ H ₁₂ O ₂	<i>d</i> -Methylbenzylcarbinyl formate	164.09		110 ¹⁹	1.027 ¹²	505
3682	C ₁₀ H ₁₂ O ₂	Methyl hydrocinnamate	164.09		239	1.018 ⁴⁹	
3683	C ₁₀ H ₁₂ O ₂	Phenyl <i>n</i> -butyrate C ₆ H ₅ CO ₂ C ₄ H ₉	164.09		228	1.027 ¹⁶	
3684	C ₁₀ H ₁₂ O ₂	<i>n</i> -Propyl benzoate C ₆ H ₅ CO ₂ C ₃ H ₇	164.09	-51.6	231.2	1.027	
3685	C ₁₀ H ₁₂ O ₂	Thymoquinone	164.09	45.5	232		
3686	C ₁₀ H ₁₂ O ₂	Coniferyl alcohol	180.09	74			
3687	C ₁₀ H ₁₂ O ₂	Benzyl lactate	180.09		130 ⁶		1025
3688	C ₁₀ H ₁₂ O ₂	Ethyl anisate <i>p</i> -CH ₃ OC ₆ H ₄ CO ₂ C ₂ H ₅	180.09	7.8	263	1.106	680

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3689	$C_{10}H_{13}O_2$	Ethyl mandelate	180.09	34	255		
3690	$C_{10}H_{13}O_2$	Propyl salicylate $o\text{-HOC}_6\text{H}_4\text{CO}_2\text{C}_3\text{H}_7$	180.09		240	1.099 ^{1a}	
3691	$C_{10}H_{13}O_4$	Cantharic acid	196.09	278			
3692	$C_{10}H_{13}O_4$	Ethyl vanillate	196.09	44	293		
3693	$C_{10}H_{13}O_4$	Cantharidin	196.09	212			
3694	$C_{10}H_{13}O_4$	Guaiacyl methyl glycolate	196.09		156 ^{1a}	1.180	
3695	$C_{10}H_{13}O_4$	Sparassol	196.09	68			
3696	$C_{10}H_{13}O_4$	Asarone acid	212.09	144	300		
3697	$C_{10}H_{13}O_4$	Glycerol monosalicylate	212.09	76		1.366	
3698	$C_{10}H_{13}O_4$	β -Anemonine acid	228.09	189			
3699	$C_{10}H_{13}ClO$	4-Chlorothymol	184.56	64			
3700	$C_{10}H_{13}ClO$	6-Chlorothymol	184.56	64			
3701	$C_{10}H_{13}N$	Karoline (1-Methyl-1, 2, 3, 4-tetrahydroquinoline)	147.11		245.5	1.021	1005
3702	$C_{10}H_{13}N$	5, 6, 7, 8-Tetrahydro- α -naphthylamine	147.11		276.8	1.054 ^{1a, 1b}	1006
3703	$C_{10}H_{13}N$	5, 6, 7, 8-Tetrahydro- β -naphthylamine	147.11	38	278.5	1.029 ^{1a, 1b}	986
3704	$C_{10}H_{13}NO$	<i>o</i> -Acetylmethyltoluidine	163.11	56			
3705	$C_{10}H_{13}NO$	<i>p</i> -Acetylmethyltoluidine	163.11	80			
3706	$C_{10}H_{13}NO$	<i>N</i> -Butyramide $C_6H_5NHOCCH_2CH_2CH_3$	163.11	92	189 ^{1a}		
3707	$C_{10}H_{13}NO$	3, 5-Dimethylacetanilide	163.11	174			
3708	$C_{10}H_{13}NO$	ω -Dimethylaminoacetophenone	163.11	59			
3709	$C_{10}H_{13}NO$	<i>N</i> -Ethylacetanilide	163.11	54.5	259	0.994 ^{1a}	
3710	$C_{10}H_{13}NO$	Thalline	163.11	43	283.8		
3711	$C_{10}H_{13}NO_2$	1-Aminobutyric acid	179.11	141			
3712	$C_{10}H_{13}NO_2$	Propyl <i>p</i> -aminobenzoate	179.11	76			
3713	$C_{10}H_{13}NO_2$	<i>o</i> -Acetphenetidine	179.11	79	<250		
3714	$C_{10}H_{13}NO_2$	<i>m</i> -Acetphenetidine	179.11	96			
3715	$C_{10}H_{13}NO_2$	2-Nitrocymene	179.11		152 ^{1a}	1.085 ^{1a}	
3716	$C_{10}H_{13}NO_2$	Phenacetin $C_6H_5OC_2H_4NHCOCH_3$	179.11	135	d.		1246
3717	$C_{10}H_{13}NO_2$	Damasceenine	195.11	27	168		
3718	$C_{10}H_{13}NO_2$	2-Nitrothymol	195.11	119			
3719	$C_{10}H_{13}NO_2$	4-Nitrothymol	195.11	142			
3720	$C_{10}H_{13}NO_2$	Ratanhine	195.11	252			
3721	$C_{10}H_{13}NO_2$	Surinamine (<i>N</i> -Methyltyrosine)	195.11	280 d.			
3722	$C_{10}H_{13}N_2O_4$	2, 4-Dinitro- <i>N</i> -diethylaniline	239.12	80			
3723	$C_{10}H_{13}N_2O_4$	Veramine	283.14	240			
3724	$C_{10}H_{14}$	<i>n</i> -Butylbenzene $(CH_3)(CH_2)_3C_6H_5$	134.11		180	0.862	554
3725	$C_{10}H_{14}$	<i>sec</i> -Butylbenzene $C_2H_5(CH_2)CH(C_2H_5)C_6H_5$	134.11		175	0.860	550
3726	$C_{10}H_{14}$	<i>tert</i> -Butylbenzene $(CH_3)_3C.C_6H_5$	134.11		168.7	0.867	582
3727	$C_{10}H_{14}$	<i>o</i> -Cymene $o\text{-C}_6\text{H}_4(CH_2)_2C_6H_5$	134.11		157	0.858 ^{1a}	601
3728	$C_{10}H_{14}$	<i>m</i> -Cymene $m\text{-C}_6\text{H}_4(CH_2)_2C_6H_5$	134.11	> -25	175	0.860	559
3728 1	$C_{10}H_{14}$	<i>p</i> -Cymene $p\text{-C}_6\text{H}_4(CH_2)_2C_6H_5$	134.11	-73.5	176	0.857	1022
3729	$C_{10}H_{14}$	<i>o</i> -Diethylbenzene $o\text{-(C}_2\text{H}_5)_2C_6H_4$	134.11	< -20	184.5	0.866	
3730	$C_{10}H_{14}$	<i>m</i> -Diethylbenzene $m\text{-(C}_2\text{H}_5)_2C_6H_4$	134.11	< -20	182	0.860	
3731	$C_{10}H_{14}$	<i>p</i> -Diethylbenzene $p\text{-(C}_2\text{H}_5)_2C_6H_4$	134.11	-35	183	0.865	569.1
3732	$C_{10}H_{14}$	1, 2, 4, 5-Tetramethylbenzene	134.11	80	195	0.838 ^{1a, 1b}	1273
3733	$C_{10}H_{14}$	4-Ethyl- <i>m</i> -xylene $C_6H_3C_2H_5(CH_3)_2$	134.11	< -20	183	0.878	
3734	$C_{10}H_{14}$	5-Ethyl- <i>m</i> -xylene $C_6H_3C_2H_5(CH_3)_2$	134.11	< -20	185	0.861	
3735	$C_{10}H_{14}$	Hexahydronaphthalene	134.11		205.5	0.934	
3736	$C_{10}H_{14}$	Isobutylbenzene $(CH_3)_2CHCH_2C_6H_5$	134.11		171.4	0.858 ^{1a}	562
3739	$C_{10}H_{14}$	1, 2, 3, 5-Tetramethylbenzene	134.11		197	0.896 ^{1a}	
3740	$C_{10}H_{14}$	1, 2, 3, 4-Tetramethylbenzene	134.11	-4	204	0.901	662
3741	$C_{10}H_{14}$	Verbenene	134.11		159	0.886 ^{1a}	593
3742	$C_{10}H_{14}Br_2O$	<i>d</i> - α , α' -Dibromocamphor	309.94	61			1209
3743	$C_{10}H_{14}ClN$	Thermin (Tetrahydro- β -naphthylamine hydrochloride)	183.57	237			
3744	$C_{10}H_{14}Cl_2O$	α -Dichlorocamphor	221.02	96	200 d.	4.2	
3745	$C_{10}H_{14}Cl_2O$	β -Dichlorocamphor	221.02	77			
3746	$C_{10}H_{14}N_2$	Isonicotine	162.12	78	260 d.		
3747	$C_{10}H_{14}N_2$	Nicotine	162.12		274.3	1.009	695
3748	$C_{10}H_{14}N_2$	Nicotimine	162.12		250		
3749	$C_{10}H_{14}N_2O_2$	6-Nitroso-3-(diethylamino) phenol	194.12	84			
3750	$C_{10}H_{14}N_2O$	<i>p</i> -Nitroso- <i>N</i> -diethylaniline	178.12	84			

C-TABLE: C₁₀H₁₆ TO C₁₅H₂₄

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No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3751	C ₁₀ H ₁₄ N ₂ O ₂	Phenocoll <i>p</i> -C ₂ H ₄ OC ₆ H ₄ NHCOCH ₂ NH ₂	194 12	100 5			
3752	C ₁₀ H ₁₄ O	Carvacrol	150 11	0 5	237 9	0 976	678
3753	C ₁₀ H ₁₄ O	<i>d</i> -Carvol	150 11		225	0 960	940
3754	C ₁₀ H ₁₄ O	Cuminal alcohol	150 11		246 6	0 978 ¹⁴	
3754 1	C ₁₀ H ₁₄ O	Methyl <i>d</i> -methylbenzyl carbinol	150 11		85 ¹⁴	0 927 ²⁷	
3754 2	C ₁₀ H ₁₄ O	Methyl <i>l</i> -phenylethyl carbinol	150 11		132 ¹⁴	0 9767	658
3755	C ₁₀ H ₁₄ O	3-Methyl-2-hydroxyisopropylbenzene	150 11		226	0 987 ^{14, 2}	669
3756	C ₁₀ H ₁₄ O	Thymol (CH ₃) ₂ CHC ₆ H ₃ (OH)(CH ₃)	150 11	51 5	231 8	0 969	1170
3757	C ₁₀ H ₁₄ O	5-Methyl-2-hydroxyisopropylbenzene	150 11	36	229	0 982 ²¹⁷ a	674
3758	C ₁₀ H ₁₄ O	Benzyl propyl ether C ₆ H ₅ CH ₂ OC ₃ H ₇	150 11		196		
3759	C ₁₀ H ₁₄ O	<i>n</i> -Butyl phenyl ether C ₆ H ₅ OC ₄ H ₉	150 11		210 3	0 950 ⁶	
3760	C ₁₀ H ₁₄ O	Isobutyl phenyl ether	150 11		198	0 939 ¹⁴	
3761	C ₁₀ H ₁₄ O	Myrtanal (Myrtene aldehyde)	150 11		90 ¹⁰	0 988	616
3762	C ₁₀ H ₁₄ O	Eucarvol	150 11		106 ²⁰	0 952	845
3763	C ₁₀ H ₁₄ O	Pinocarvol	150 11		224	0 984	620
3764	C ₁₀ H ₁₄ O	<i>d</i> (<i>l</i>)-Piperitone	150 11		235	0 934 ^{var}	542
3765	C ₁₀ H ₁₄ O	Umbellulone	150 11		220	0 958	551
3766	C ₁₀ H ₁₄ O ₂	<i>o</i> -Diethoxybenzene <i>o</i> -(C ₂ H ₅ O) ₂ C ₆ H ₄	166 11	45			
3767	C ₁₀ H ₁₄ O ₂	Coerulguinol	166 11		216	1 049 ¹⁴	
3768	C ₁₀ H ₁₄ O ₂	Hydroquinone diethyl ether	166 11	72			
3769	C ₁₀ H ₁₄ O ₂	Resorcinol diethyl ether	166 11	12 4	235 2		
3770	C ₁₀ H ₁₄ O ₂	<i>d</i> -Camphorquinone	166 11	198			
3771	C ₁₀ H ₁₄ O ₂	Thymohydroquinone	166 11	113	290		
3772	C ₁₀ H ₁₄ O ₂	Crocetin	166 11	101			
3773	C ₁₀ H ₁₄ O ₂	<i>dl</i> -Camphoric anhydride	182 11	221	270		
3774	C ₁₀ H ₁₄ O ₄	1, 2, 3, 5-Tetramethoxybenzene	198 11	47	271		
3775	C ₁₀ H ₁₄ O ₄	Guaiamar	198 11	75			
3776	C ₁₀ H ₁₄ O ₄	Diethyl malconate	198 11	13; 62	64	0 983 ²⁹ 1	
3777	C ₁₀ H ₁₄ O ₄	Pinoylformic acid	214 11	80			
3777.1	C ₁₀ H ₁₄ O ₄	Diallyl tartrate	230 11		191 ²⁰	1 187 ^{24, 4}	
3778	C ₁₀ H ₁₅ BrO	α -Bromocamphor	231 03	78	274	1 449	1252
3779	C ₁₀ H ₁₅ BrO	β -Bromocamphor	231 03	61	130 ¹⁰		
3780	C ₁₀ H ₁₅ Cl	Myrtenyl chloride	170 57		90 ¹²	1 015	586
3782	C ₁₀ H ₁₅ ClO	α -Chlorocamphor	186 57	125	220 w d		
3783	C ₁₀ H ₁₅ ClO	β -Chlorocamphor	186 57	92 5	247		
3784	C ₁₀ H ₁₅ ClO	γ -Chlorocamphor	186 57	100	237 w d.		
3785	C ₁₀ H ₁₅ N	<i>n</i> -Butylaniline C ₆ H ₅ NHC ₄ H ₉	149 12		240 9		
3786	C ₁₀ H ₁₅ N	2-Dimethylamino- <i>m</i> -xylene	149 12		196 2	0 915	649
3787	C ₁₀ H ₁₅ N	4-Dimethylamino- <i>m</i> -xylene	149 12		232 2	0 939	730
3788	C ₁₀ H ₁₅ N	4-Dimethylamino- <i>o</i> -xylene	149 12		205	0 916	663
3789	C ₁₀ H ₁₅ N	Diethylaniline C ₆ H ₅ N(C ₂ H ₅) ₂	149 12	-34 4	216 27	0 934	717
3790	C ₁₀ H ₁₅ N	Isobutylaniline C ₆ H ₅ NHC(CH ₃) ₂ CH ₃	149 12		242	0.940	
3791	C ₁₀ H ₁₅ N	Prehnidine 1, 2, 3, 4-C ₆ H ₄ (CH ₃) ₄	149 12	70	260		
3792	C ₁₀ H ₁₅ NO	<i>m</i> -Diethylaminophenol	165 12	78	278		
3793	C ₁₀ H ₁₅ NO	Ephedrine	165 12	40	255		
3794	C ₁₀ H ₁₅ NO	Hordenine	165 12	118	174 ¹¹		
3795	C ₁₀ H ₁₅ NO	Pseudoephedrine	165 12	117			
3796	C ₁₀ H ₁₅ NO ₂ S	Diethylaniline- <i>m</i> -sulfonic acid	229 19	270 d.			
3797	C ₁₀ H ₁₅ N ₂ O ₃	Pilocarpidine nitrate	257 14	137			1333
3800	C ₁₀ H ₁₆	<i>l</i> -Bornylene	136 12	111	147		
3801	C ₁₀ H ₁₆	<i>dl</i> -Camphene	136 12	50	160	0 822	1116
3802	C ₁₀ H ₁₆	<i>d</i> (<i>l</i>)-Camphene	136 12	42 7	159		1074
3803	C ₁₀ H ₁₆	Camphilene	136 12		156	0 87 ¹⁴	
3804	C ₁₀ H ₁₆	<i>d</i> (<i>l</i>)- Δ^4 -Carene	136 12		167 ⁷⁰⁷	0 855 ¹⁰	1037
3805	C ₁₀ H ₁₆	Cyclofenchene	136 12		144	0 861	445
3806	C ₁₀ H ₁₆	Dipentene	136 12		176	0 865 ¹⁴	515
3807	C ₁₀ H ₁₆	<i>d</i> (<i>l</i>)-Fenchene	136 12		150	0 869	955
3808	C ₁₀ H ₁₆	Fenchylene	136 12		142	0 840	435
3809	C ₁₀ H ₁₆	Geraniene	136 12		164	0.843	
3810	C ₁₀ H ₁₆	<i>d</i> (<i>l</i>)-Limonene	136 12	-96 9	177	0 842	510
3811	C ₁₀ H ₁₆	Myrcene	136 12		167	0 802	503
3812	C ₁₀ H ₁₆	Ocimene	136 12		74 ²¹	0.799	835
3813	C ₁₀ H ₁₆	<i>cis</i> - β -Octalin	136 12		73 ¹⁴	0.915	984

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3814	C ₁₀ H ₁₆	<i>trans</i> - β -Octalin	136.12		190	0.909 ¹³	
3815	C ₁₀ H ₁₆	<i>d</i> (<i>l</i>)- α -Phellandrene	136.12		175	0.843	983
3816	C ₁₀ H ₁₆	β -Phellandrene	136.12		171	0.852	527
3817	C ₁₀ H ₁₆	<i>dl</i> - α -Pinene	136.12	-55	154	0.878	
3818	C ₁₀ H ₁₆	<i>l</i> - β -Pinene	136.12		164	0.873 ¹⁵	824
3819	C ₁₀ H ₁₆	Sabinene	136.12		165	0.842	914
3820	C ₁₀ H ₁₆	<i>d</i> (<i>l</i>)-Sylvestrene	136.12		177	0.863	919
3821	C ₁₀ H ₁₆	α -Terpinene	136.12		175	0.834	915
3822	C ₁₀ H ₁₆	β -Terpinene	136.12		174	0.840	982
3823	C ₁₀ H ₁₆	Δ^1 - β -Terpinene	136.12		182	0.855	541
3824	C ₁₀ H ₁₆	Terpinolene	136.12		185	0.855	537
3825	C ₁₀ H ₁₆	Terpinylene	136.12		175		
3826	C ₁₀ H ₁₆	α -Thujene	136.12		151	0.830	440
3827	C ₁₀ H ₁₆	β -Thujene	136.12		147.7	0.821	420
3828	C ₁₀ H ₁₅ ClNO	Ephedrine hydrochloride	201.59	210			
3829	C ₁₀ H ₁₅ ClNO	α -Limonene nitrosylchloride	201.60	104			
3830	C ₁₀ H ₁₅ ClNO	Pseudoephedrine hydrochloride	201.59	175			
3831	C ₁₀ H ₁₆ Cl ₂	α -Camphordichloride	207.04	148			
3832	C ₁₀ H ₁₆ Cl ₂	β -Camphordichloride	207.04	178			
3833	C ₁₀ H ₁₅ N ₂	<i>p</i> -Aminodiethylaniline	164.14		262		
3834	C ₁₀ H ₁₅ N ₂	<i>o</i> -Tetramethylphenylenediamine	164.14		218		
3835	C ₁₀ H ₁₅ N ₂	<i>m</i> -Tetramethylphenylenediamine	164.14	-2	262	0.988 ¹⁵	
3836	C ₁₀ H ₁₅ N ₂	<i>p</i> -Tetramethylphenylenediamine	164.14	51	260		
3837	C ₁₀ H ₁₅ N ₂ O ₂	α -Camphordioxime	196.14	182 d.			
3838	C ₁₀ H ₁₅ N ₂ O ₂	γ -Camphordioxime	196.14	132			
3839	C ₁₀ H ₁₅ N ₃ O ₃	5, 5- <i>n</i> -Butylethylbarbituric acid	212.14	128			
3840	C ₁₀ H ₁₅ N ₃ O ₃	5, 5- <i>sec</i> -Butylethylbarbituric acid	212.14	157			
3841	C ₁₀ H ₁₅ N ₃ O ₃	5, 5-Dipropylbarbituric acid	212.14	145			
3842	C ₁₀ H ₁₅ N ₃ O ₃	5, 5-Isobutylethylbarbituric acid	212.14	176			
3843	C ₁₀ H ₁₅ N ₃ O ₃	5, 5- <i>n</i> -Propylisopropylbarbituric acid	212.14	162			
3844	C ₁₀ H ₁₆ O	Alantol	152.12		200		
3845	C ₁₀ H ₁₆ O	<i>dl</i> -Camphor	152.12	174			
3846	C ₁₀ H ₁₆ O	<i>d</i> -Camphor	152.12	179	209.1	0.990 ¹⁵	
3847	C ₁₀ H ₁₆ O	Carvenone	152.12		233	0.926	897
3848	C ₁₀ H ₁₆ O	Caryophyllin	152.12	205			
3849	C ₁₀ H ₁₆ O	α -Citral	152.12		229	0.893 ¹⁵	920
3850	C ₁₀ H ₁₆ O	β -Citral	152.12		104 ¹²	0.888	956
3851	C ₁₀ H ₁₆ O	Cyclocitral	152.12		114 ²⁰	0.957 ¹⁵	825
3852	C ₁₀ H ₁₆ O	<i>d</i> -Fenchone	152.12	6	195	0.944	839
3853	C ₁₀ H ₁₆ O	Hartin	152.12	230		1.120	
3854	C ₁₀ H ₁₆ O	Isopulegon	152.12		90 ¹²	0.921 ¹⁷	499
3855	C ₁₀ H ₁₆ O	Myristicol	152.12		218		
3856	C ₁₀ H ₁₆ O	Myrtenol	152.12		224	0.976	581
3857	C ₁₀ H ₁₆ O	Phellandral	152.12		230	0.945	553
3858	C ₁₀ H ₁₆ O	Pinol	152.12		184	0.942	507
3859	C ₁₀ H ₁₆ O	Pulegon	152.12		224	0.937	861
3860	C ₁₀ H ₁₆ O	Sabinol	152.12		209	0.943	546
3861	C ₁₀ H ₁₆ O	α -Thujone	152.12		200	0.913	827
3862	[C ₁₀ H ₁₆ O] _x	Ursol	[152.12] _x	264			
3863	C ₁₀ H ₁₆ O ₂	Acetyl methylheptenone	168.12	-6	234	0.945 ¹⁵	860
3864	C ₁₀ H ₁₆ O ₂	Ascaridol	168.12		84 ⁵	1.008 ¹⁵	518
3865	C ₁₀ H ₁₆ O ₂	Geranic acid	168.12		119 ²⁰	0.952	544
3866	C ₁₀ H ₁₆ O ₂	Hydroxycamphor	168.12	205			
3867	C ₁₀ H ₁₆ O ₂	<i>d</i> (<i>l</i>)-Pinonic acid	184.12	99	180 ¹²		
3867.1	C ₁₀ H ₁₆ O ₂	<i>dl</i> -Pinonic acid	184.12	105		1.216	
3868	C ₁₀ H ₁₆ O ₄	<i>dl</i> -Camphoric acid	200.12	202			
3869	C ₁₀ H ₁₆ O ₄	<i>d</i> -Camphoric acid	200.12	187			
3870	C ₁₀ H ₁₆ O ₄	Cyclohexyl acid succinate	200.12	44			
3871	C ₁₀ H ₁₆ O ₄	<i>dl</i> -Isocamphoric acid	200.12	191			
3872	C ₁₀ H ₁₆ O ₄	<i>d</i> -Methyl pinate	200.12		130 ⁹	1.055	
3873	C ₁₀ H ₁₆ O ₄	<i>l</i> -Cineolic acid	216.12	196			1325
3874	C ₁₀ H ₁₆ O ₄	Diethyl acetylsuccinate	216.12		256 d.	1.081	884
3875	C ₁₀ H ₁₇ Br	<i>d</i> -Pinene hydrobromide	217.05	80			

C-TABLE: C₁₀H₁₇ TO C₁₀H₁₈

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No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3876	C ₁₀ H ₁₇ Cl	Camphene hydrochloride	172 59	150 5			
3877	C ₁₀ H ₁₇ Cl	cis- β -Chlorodecalin.	172 59		112 ^{1a}		
3878	C ₁₀ H ₁₇ Cl	Fenchyl chloride	172 59		85 ^{1a}	0 983	
3879	C ₁₀ H ₁₇ Cl	Geranyl chloride	172 59		103 ^{1a}	0 918 ^{1a}	517
3880	C ₁₀ H ₁₇ Cl	Isobornyl chloride	172 59	161 5			
3881	C ₁₀ H ₁₇ Cl	d-Pinene hydrochloride	172 59	128	207 1		
3882	C ₁₀ H ₁₇ N	Camphenamine . . .	151 14		205 5	0 940	564
3883	C ₁₀ H ₁₇ N	Pinyllamine	151 14		207	0 940	613
3884	C ₁₀ H ₁₇ NO	Camphoroxime	167 14	119 5	249		
3885	C ₁₀ H ₁₇ NO	d-Fenchoneoxime	167 14	165	240		
3886	C ₁₀ H ₁₇ NO ₂	l-Eegonine methyl ester	199 14			1 147	547
3886 1	C ₁₀ H ₁₇ NO ₂	dl- α -Pinone oxime.	199 14	150		1 210	
3887	C ₁₀ H ₁₇ NO ₄	Phascolumatin . . .	247 14	144			
3888	C ₁₀ H ₁₈	Camphane	138 14	152	160		
3889	C ₁₀ H ₁₈	Carane	138 14		50 ^a	0.838 ¹⁰	459
3890	C ₁₀ H ₁₈	cis-Decahydronaphthalene	138 14	- 125	193 3	0 898	539
3891	C ₁₀ H ₁₈	trans-Decahydronaphthalene	138 14		185 3	0 872	504
3892	C ₁₀ H ₁₈	d-Menthene	138 14		168	1 4481	423
3893	C ₁₀ H ₁₈	d-Pinane	138 14	- 45	160 1	0 839	448
3894	C ₁₀ H ₁₈	Pinocamphane	138 14		164 9	0 856	477
3895	C ₁₀ H ₁₈	Thujane	138 14		157	0 814	363
3896	C ₁₀ H ₁₈ Cl ₂ N ₂	o-Tetramethylphenylenediamine hydrochloride	237 07	180			
3897	C ₁₀ H ₁₈ O	Apopinol	154 14		199	0 804 ^{1a}	
3899	C ₁₀ H ₁₈ O	Aurantiol	154 14		95 ^{1a}	0 869 ^{1a}	
3900	C ₁₀ H ₁₈ O	dl-Borneol	154 14	210 5			
3901	C ₁₀ H ₁₈ O	d(l)-Borneol	154 14	208 6	213 5	1.011	
3902	C ₁₀ H ₁₈ O	Cineol	154 14	- 1	176 4	0.901 ^{1a}	474
3903	C ₁₀ H ₁₈ O	d-Citronellal	154 14		208	0 856	
3904	C ₁₀ H ₁₈ O	dl-Fenchyl alcohol	154 14	33	204 6	0 953	
3905	C ₁₀ H ₁₈ O	dl, (d)-Fenchyl alcohol	154 14	42	201	0 935 ^{1a}	
3906	C ₁₀ H ₁₈ O	dl, (l)-Fenchyl alcohol	154 14	47	201	0 933 ^{1a}	
3907	C ₁₀ H ₁₈ O	d, (l)-Fenchyl alcohol	154 14	49	209		
3908	C ₁₀ H ₁₈ O	Geraniol	154 14	< -15	229	0 881	531
3909	C ₁₀ H ₁₈ O	dl-Isoborneol	154 14	212			
3910	C ₁₀ H ₁₈ O	d(l)-Isoborneol	154 14	216			
3911	C ₁₀ H ₁₈ O	dl-Isfenchyl alcohol	154 14		204		
3912	C ₁₀ H ₁₈ O	l-Isfenchyl alcohol.	154 14	62	202	0.961 ^{1a}	859
3913	C ₁₀ H ₁₈ O	Isopulegol	154 14		102 ^{1a}	0 915	513
3913 1	C ₁₀ H ₁₈ O	l-Isopulegol	154 14		94 ^{1a}	0.9110	509
3914	C ₁₀ H ₁₈ O	Lavendol	154 14		199	0 873 ^{1a}	
3915	C ₁₀ H ₁₈ O	d-Linalool	154 14		198 3	0 875	480
3916	C ₁₀ H ₁₈ O	l-Linalool	154 14		195	0 866 ^{1a}	981
3917	C ₁₀ H ₁₈ O	dl-Menthone	154 14		210	0 897	441
3918	C ₁₀ H ₁₈ O	l-Menthone	154 14		207	0 896	
3919	C ₁₀ H ₁₈ O	Myrcenol	154 14		161 ^{1a}	0 901 ^{1a}	840
3920	C ₁₀ H ₁₈ O	Nerol	154 14		225 2	0 881	
3921	C ₁₀ H ₁₈ O	Pinen hydrate (Homopinol)	154 14	59	205		
3922	C ₁₀ H ₁₈ O	dl, α -Terpineol.	154 14	35	219 8	0 936	538
3923	C ₁₀ H ₁₈ O	d(l), α -Terpineol	154 14	40	217 7	0 919	890
3924	C ₁₀ H ₁₈ O	β -Terpineol	154 14	33	210 3	0 819 ^{1a}	521
3925	C ₁₀ H ₁₈ O	γ -Terpineol	154 14	70			
3926	C ₁₀ H ₁₈ O	dl-Terpinen-4-ol . . .	154 14		214	0 929	533
3927	C ₁₀ H ₁₈ O	d-Terpinen-4-ol (Origanol)	154 14		212	0 926	526
3928	C ₁₀ H ₁₈ O	Thujyl alcohol . . .	154 14		212	0 921	923
3929	C ₁₀ H ₁₈ O ₂	Acetylmethyl hexyl ketone	170 14	-6	237 d.	0 907 ^{1a}	
3930	C ₁₀ H ₁₈ O ₂	d(l)-Campholic acid	170 14	107	260		
3931	C ₁₀ H ₁₈ O ₂	d-Citronellie acid	170 14		257	0 931	
3932	C ₁₀ H ₁₈ O ₂	9, 10-Decylenic acid	170 14	<0	142 ^a		
3933	C ₁₀ H ₁₈ O ₂	Fencholic acid . . .	170 14	18	255	0.970 ^{1a}	462
3934	C ₁₀ H ₁₈ O ₂	Pinol glycol	186 14	129			
3935	C ₁₀ H ₁₈ O ₂	n-Valeric anhydride (C ₄ H ₉ CO) ₂ O . .	186 14		215	0.929	
3936	C ₁₀ H ₁₈ O ₂	Isovaleric anhydride	186 14		215	0.933	229

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3937	C ₁₆ H ₁₈ O ₂	Ethyl diethylacetacetate	186 14		158.2	1.282	327
3938	C ₁₆ H ₁₈ O ₄	Sebacic acid HO ₂ C(CH ₂) ₈ CO ₂ H	202 14	127	294.5 ¹⁰⁰		1161
3939	C ₁₆ H ₁₈ O ₄	Isoamyl ethyl malonate	202 14		150 ²⁰	0.954 ²⁵	306
3940	C ₁₆ H ₁₈ O ₄	<i>n</i> -Butyl isopropylmalonate	202 14		136 ¹⁴	0.974 ²⁵	331
3941	C ₁₆ H ₁₈ O ₄	Di- <i>n</i> -butyl oxalate (CO ₂ C ₄ H ₉) ₂	202 14		243.4	1.0108	
3942	C ₁₆ H ₁₈ O ₄	Diisobutyl oxalate	202 14		229	1.002 ¹⁴	
3943	C ₁₆ H ₁₈ O ₄	Dipropyl succinate	202 14		250.8	1.006 ¹⁵	
3944	C ₁₆ H ₁₈ O ₄	Dipropyl malate	218 14	10 5	151 ¹⁰	1.075	366
3945	C ₁₆ H ₁₈ O ₄	Dipropyl <i>d</i> -tartrate [HO(CHCO ₂ C ₃ H ₇) ₂	234 14		303	1.139	
3945 1	C ₁₆ H ₁₈ O ₄	Di- <i>sec</i> .-propyl tartrate	234 14		158 ¹⁶	1.116 ^{11,7}	
3946	C ₁₆ H ₁₈ O ₃	Arabin,	282 14	260			
3947	C ₁₆ H ₁₉ Cl	<i>sec</i> .-Menthyl chloride	174 60		215	0.941	485
3948	C ₁₆ H ₁₉ Cl	<i>tert</i> -Menthyl chloride	174 60		94 ¹⁴ 5	0.948	488
3949	C ₁₆ H ₁₉ N	Bornylamine	153 15	163	200		
3950	C ₁₆ H ₁₉ N	Camphylamine	153 15		198		
3951	C ₁₆ H ₁₉ N	<i>l</i> -Fenchylamine	153 15		195	0.910 ²²	
3952	C ₁₆ H ₁₉ N	Geranylamine	153 15		105 ¹⁹	0.829 ²⁵	511
3953	C ₁₆ H ₁₉ NO	Lupinine	169 15	68	257		
3954	C ₁₆ H ₁₉ NO ₃	Sebacic acid	201 15	170			
3955	C ₁₆ H ₂₀	α -Decylene CH ₂ CH(CH ₂) ₇ CH ₃	140 15		172	0.763 ⁹	912
3956	C ₁₆ H ₂₀	γ -Decylene C ₆ H ₅ CH(CH ₂) ₄ H ₁₁	140 15		161		
3957	C ₁₆ H ₂₀	2, 3-Dimethyl-2-octene	140 15		102 ²⁵⁰	0.748	
3958	C ₁₆ H ₂₀	2, 6-Dimethyl-1(2)-octene	140 15		169	0.789 ⁹	993
3959	C ₁₆ H ₂₀	<i>o</i> -Menthane	140 15		171	0.814	965
3960	C ₁₆ H ₂₀	<i>m</i> -Menthane	140 15		168.2	0.790	387
3961	C ₁₆ H ₂₀	<i>p</i> -Menthane	140 15		170	0.793	358
3962	C ₁₆ H ₂₀	2-Methyl-5-ethyl-5-heptene	140 15		158.4	0.761 ⁹	302
3963	C ₁₆ H ₂₀	3, 3, 5-Trimethyl-4-heptene	140 15		157.5	0.788 ⁹	
3964	C ₁₆ H ₂₀ ClNO	Lupinine hydrochloride	205 62	213			1244
3965	C ₁₆ H ₂₀ N ₂ O ₈	Glycitol (Dimethylpiperazine tartrate)	264 17	250			
3966	C ₁₆ H ₂₀ O	α -Curvamenthol	156 15		219		
3967	C ₁₆ H ₂₀ O	β -Curvamenthol	156 15		222	0.918 ⁹	
3968	C ₁₆ H ₂₀ O	<i>d</i> -Citronellol	156 15		221.7	0.857 ¹⁵	410
3969	C ₁₆ H ₂₀ O	<i>l</i> -Citronellol	156 15		114 ¹⁵	0.861	464
3970	C ₁₆ H ₂₀ O	<i>d</i> -Isomenthol	156 15	83			
3971	C ₁₆ H ₂₀ O	<i>o</i> -Menthane-2-ol	156 15		95 ²⁵		
3972	C ₁₆ H ₂₀ O	<i>p</i> -Menthane-8-ol	156 15	36	207.4		
3973	C ₁₆ H ₂₀ O	<i>l</i> - α -Menthol . . .	156 15	42 5	212	0.890 ¹⁵	1168
3974	C ₁₆ H ₂₀ O	<i>l</i> - β -Menthol . . .	156 15	35 5	212	0.890 ¹⁵	
3974 1	C ₁₆ H ₂₀ O	<i>l</i> -Neomenthol	156 15	< -15	105 ²¹	0.899 ⁵	473
3975	C ₁₆ H ₂₀ O	<i>n</i> -Capric aldehyde CH ₃ (CH ₂) ₈ CHO	156 15		209.2	0.828 ¹⁵	307
3976	C ₁₆ H ₂₀ O	Isocaproic aldehyde	156 15		169.6	0.828 ⁹	
3977	C ₁₆ H ₂₀ O	Isopropyl <i>n</i> -hexyl ketone	156 15		210	0.841 ¹⁷	
3978	C ₁₆ H ₂₀ O	Methyl <i>n</i> -octyl ketone CH ₃ COC ₈ H ₁₇	156 15	3.5	211	0.825	
3978 1	C ₁₆ H ₂₀ O	Propyl hexyl ketone C ₃ H ₇ COC ₆ H ₁₃	156 15	-9	207	0.824	
3979	C ₁₆ H ₂₀ O ₂	<i>cis</i> -Terpine	172 15	104.7	258		
3980	C ₁₆ H ₂₀ O ₂	<i>trans</i> -Terpine	172 15	158	265		
3981	C ₁₆ H ₂₀ O ₂	<i>n</i> -Capric acid CH ₃ (CH ₂) ₈ CO ₂ H	172 15	31	268.4	0.895 ³⁰	1038
3981 1	C ₁₆ H ₂₀ O ₂	Di- <i>n</i> -butylacetic acid	172 15		140 ¹⁶	0.898 ¹⁸ 4	
3982	C ₁₆ H ₂₀ O ₂	<i>n</i> -Amyl valerate C ₅ H ₁₁ CO ₂ C ₆ H ₁₃	172 15		203.7	0.881 ⁹	213
3983	C ₁₆ H ₂₀ O ₂	<i>n</i> -Butyl caproate C ₆ H ₁₃ CO ₂ C ₄ H ₉	172 15		204.3	0.882 ⁹	
3984	C ₁₆ H ₂₀ O ₂	Ethyl <i>n</i> -caprylate C ₇ H ₁₅ CO ₂ C ₂ H ₅	172 15	-44 8	205.8	0.878 ¹⁷	
3985	C ₁₆ H ₂₀ O ₂	<i>n</i> -Heptyl propionate C ₂ H ₅ CO ₂ C ₇ H ₁₅	172 15		208	0.885 ⁹	
3986	C ₁₆ H ₂₀ O ₂	Isoamyl isovalerate	172 15		194	0.870 ⁹	198
3987	C ₁₆ H ₂₀ O ₂	Methyl pelargonate C ₅ H ₁₁ CO ₂ CH ₃	172 15		214	0.877 ¹⁷ 5	
3988	C ₁₆ H ₂₀ O ₂	<i>d</i> - γ -Nonyl formate	172 15		95 ²²	0.869	258
3989	C ₁₆ H ₂₀ O ₂	<i>n</i> -Octyl acetate CH ₃ CO ₂ C ₈ H ₁₇	172 15	-38.5	210	0.885 ⁹	250
3991	C ₁₆ H ₂₀ O ₃	1-Hydroxycapric acid	188.15	70 5			
3992	C ₁₆ H ₂₁ N	<i>l</i> -Menthylamine	155.17		208.2	0.860	475
3993	C ₁₆ H ₂₂	<i>n</i> -Decane CH ₃ (CH ₂) ₈ CH ₃	142.17	-32.0	174	0.747	220
3994	C ₁₆ H ₂₂	2, 6-Dimethyloctane	142.17		159	0.734	185
3995	C ₁₆ H ₂₂	2, 7-Dimethyloctane	142.17	-52.8	160	0.722	171
3996	C ₁₆ H ₂₂	<i>dl</i> , 3, 6-Dimethyloctane	142 17		162		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3997	C ₁₀ H ₂₂	<i>d</i> , 3, 6-Dimethyloctane	142 17		100 8	0.735 ¹¹	
3998	C ₁₀ H ₂₂	2-Methylnonane (CH ₃) ₂ CH(CH ₂) ₆ CH ₃	142 17		160	0.728 ^{11,1}	174
3999	C ₁₀ H ₂₂	3-Methylnonane C ₂ H ₅ (CH ₂) ₅ CHC ₂ H ₅	142 17		166 9	0.735	197
4000	C ₁₀ H ₂₂	5-Methylnonane (C ₂ H ₅) ₂ CHCH ₂	142 17		166 2	0.732	189
4001	C ₁₀ H ₂₂	Tripropylmethane (C ₃ H ₇) ₃ CH	142 17		161 7	0.740 ^{11,1}	210
4002	C ₁₀ H ₂₂ O	<i>n</i> -Decyl alcohol CH ₃ (CH ₂) ₉ OH	158 17	7	231	0.820	
4003	C ₁₀ H ₂₂ O	3, 7-Dimethyl- <i>n</i> -octyl alcohol	158 17		118 ¹¹	0.849 ⁹	
4004	C ₁₀ H ₂₂ O	Methylethylisohexyl carbinol	158 17		89 ¹¹	0.834 ¹¹	851
4005	C ₁₀ H ₂₂ O	Propyl- <i>n</i> -hexyl carbinol	158 17		211	0.826	
4006	C ₁₀ H ₂₂ O	<i>n</i> -Amyl ether (C ₅ H ₁₁) ₂ O	158 17		190	0.774	
4007	C ₁₀ H ₂₂ O	Isoamyl ether [(CH ₃) ₂ CHCH ₂ CH ₂] ₂ O	158 17		172 2	0.783 ^{11,1}	172
4008	C ₁₀ H ₂₂ O ₂	<i>cis</i> -Terpine hydrate	190 15	117 1			1210
4009	C ₁₀ H ₂₂ O ₂ S ₂	<i>d</i> -Glucosediethylmercaptal	286 30	128			
4010	C ₁₀ H ₂₂ S	Diisoamyl sulfide	174 23		216	0.843	443
4011	C ₁₀ H ₂₃ N	<i>n</i> -Decylamine CH ₃ (CH ₂) ₉ NH ₂	157 19	17	218		
4012	C ₁₀ H ₂₃ N	Diisoamylamine	157 19		190	0.767	281
4013	C ₁₀ H ₂₃ Sb	Pentaethyl stibine (C ₂ H ₅) ₅ Sb	266 96		100		
4014	C ₁₀ H ₂₃ O	$\alpha(\beta)$ -Lactuceryl	166 23	181			
4015	C ₁₀ H ₂₄ O ₄	Agaric acid	230 23	142 d.			
4016	C ₁₁ H ₁₆ O ₁₀	Benzenepentacarboxylic acid	298 05	233 d.			
4017	C ₁₁ H ₇ ClO	α -Naphthoyl chloride C ₁₀ H ₇ COCl	190 51		297 5		
4018	C ₁₁ H ₇ ClO	β -Naphthoyl chloride C ₁₀ H ₇ COCl	190 51	43	306		
4019	C ₁₁ H ₇ N	α -Naphthyleyanide	153 06	33 5	296 5	1.117 ¹	
4020	C ₁₁ H ₇ N	β -Naphthyleyanide	153 06	66 5	305	1.094 ¹⁰	
4021	C ₁₁ H ₇ NO ₄	Quinoline-2, 3-dicarboxylic acid	217 06	130 d.			
4022	C ₁₁ H ₇ NO ₄	Quinoline-2, 4-dicarboxylic acid	217 06	246			
4023	C ₁₁ H ₈ O	α -Naphthaldehyde	156 06		291 6	1.148	962
4024	C ₁₁ H ₈ O	β -Naphthaldehyde	156 06	60 5		1.078 ^{99,1}	1133
4025	C ₁₁ H ₈ N ₂ O ₄	Benzoylbarbituric acid	232 08	275			
4026	C ₁₁ H ₈ O ₂	2-Hydroxy- α -naphthaldehyde	172 06	81	192 ⁹⁷		
4027	C ₁₁ H ₈ O ₂	4-Hydroxy- α -naphthaldehyde	172 06	178			
4028	C ₁₁ H ₈ O ₂	8-Hydroxy- α -naphthoic acid	188 06	169			
4029	C ₁₁ H ₈ O ₂	α -Naphthoic acid	172 06	160	300		
4030	C ₁₁ H ₈ O ₂	β -Naphthoic acid	172 06	185	>300	1.077 ¹⁰⁰	
4031	C ₁₁ H ₈ O ₂	3-Hydroxy- β -naphthoic acid	188 06	219			
4032	C ₁₁ H ₈ N	2-Phenylpyridine	155 08		270	>1	
4033	C ₁₁ H ₈ N	3-Phenylpyridine	155 08		270 4	>1	
4034	C ₁₁ H ₈ N	4-Phenylpyridine	155 08	78	275		
4035	C ₁₁ H ₈ NO ₂	Aniluvitonic acid	187 08	241			
4036	C ₁₁ H ₈ NO ₂	Quininic acid	203 08	280			
4037	C ₁₁ H ₈ NO ₆	Hydrastininic acid	251 08	164			
4038	C ₁₁ H ₁₀	α -Methylnaphthalene	142 08	-22	243	1.025	790
4039	C ₁₁ H ₁₀	β -Methylnaphthalene	142 08	35 1	245	1.029	1062
4040	C ₁₁ H ₁₀ I ₃ NO ₃	Thyroxin	584 88	250			
4041	C ₁₁ H ₁₆ O	Methyl α -naphthyl ether	158 08	<-10	258	1.096 ^{11,1}	831
4042	C ₁₁ H ₁₆ O	Methyl β -naphthyl ether	158 08	72	274		
4043	C ₁₁ H ₁₆ O ₂	Ethyl phenylpropionate	174 08		270 d.		
4043.1	C ₁₁ H ₁₁ BrN ₂ O	4-Bromoantipyrene	267 02	117			1181
4044	C ₁₁ H ₁₁ N	2, 4-Dimethylquinoline	157 09		264		
4045	C ₁₁ H ₁₁ N	2, 6-Dimethylquinoline	157 09	58	261		
4046	C ₁₁ H ₁₁ N	2, 7-Dimethylquinoline	157 09	61	265		
4047	C ₁₁ H ₁₁ N	3, 4-Dimethylquinoline	157 09	65	291		
4048	C ₁₁ H ₁₁ N	4, 6-Dimethylquinoline	157 09		256		
4049	C ₁₁ H ₁₁ N	4, 7-Dimethylquinoline	157 09	55	259		
4050	C ₁₁ H ₁₁ N	Methyl- α -naphthylamine	157 09		293		
4051	C ₁₁ H ₁₁ NO	Physostigmol	173 09	108			
4052	C ₁₁ H ₁₁ NO ₂	Indole-2-propionic acid	189 09	136			
4053	C ₁₁ H ₁₁ NO ₄	Ethyl <i>o</i> -nitrocinnamate	221 09	44			
4054	C ₁₁ H ₁₁ NO ₄	Ethyl <i>p</i> -nitrocinnamate	221 09	141			
4055	C ₁₁ H ₁₃ BrNO ₂ S	<i>p</i> -Bromophenylmercapturic acid	318 08	153			
4056	C ₁₁ H ₁₃ IN	Quinaldine methiodide	285 03	190			
4057	C ₁₁ H ₁₃ IN	Quinoline ethiodide	285 03	157	d.		
4058	C ₁₁ H ₁₃ N ₂ O	Antipyrene	188.11	109; 113	319 ¹⁷⁴		1307

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4059	C ₁₁ H ₁₃ N ₂ O ₂	4, 4-Phenylethylhydantoin	204.11	199			
4060	C ₁₁ H ₁₃ N ₂ O ₂	L-Tryptophane	204.11	289			
4060 1	C ₁₁ H ₁₃ O	Benzylidene methyl ethyl ketone	160.09	37.5		0.987 ¹⁰	1061
4061	C ₁₁ H ₁₃ O ₂	Ethyl atropate	178.09		124.4 ¹⁶	1.051	
4062	C ₁₁ H ₁₃ O ₂	<i>trans</i> -Ethyl cinnamate	178.09	6.5	271	1.049	746
4063	C ₁₁ H ₁₃ O ₂	3-Benzoylbutyric acid	192.09	126			
4064	C ₁₁ H ₁₃ O ₂	Ethyl benzoylacetate	192.09		270 d.	1.122	704
4065	C ₁₁ H ₁₃ O ₂	α -Ethyl phenylpyruvate	192.09	52	154.5 ¹⁵		
4066	C ₁₁ H ₁₃ O ₂	β -Ethyl phenylpyruvate	192.09		152 ¹⁵		
4067	C ₁₁ H ₁₃ O ₂	γ -Ethyl phenylpyruvate	192.09	79			
4068	C ₁₁ H ₁₃ O ₂	Eugenol formate	192.09		150 ²⁰		
4069	C ₁₁ H ₁₃ O ₂	Isoeugenol formate	192.09		160 ²⁰		
4071	C ₁₁ H ₁₃ O ₂	Benzylsuccinic acid	208.09	161			
4072	C ₁₁ H ₁₃ O ₂	α -Hydropiperic acid	208.09	76			
4073	C ₁₁ H ₁₃ O ₂	Sinapic acid	224.09	191			
4074	C ₁₁ H ₁₃ BrN ₂ O	Antipyrine hydrobromide	269.03	150			
4075	C ₁₁ H ₁₃ ClN ₂ O	Antipyrine hydrochloride	224.57	160			
4076	C ₁₁ H ₁₃ N	Lalolidine	159.11		156 ¹⁵		
4077	C ₁₁ H ₁₃ NO ₂	Hydrastinine	207.11	116			
4077 1	C ₁₁ H ₁₃ NO ₂	Ethyl hippurate	207.11	60.5	180	1.043 ²³	
4078	C ₁₁ H ₁₃ NO ₂	Benzacetin	223.11	190			
4079	C ₁₁ H ₁₃ NO ₂	Neurodin	223.11	87			
4080	C ₁₁ H ₁₃ N ₂ O	4-Aminoisouantipyrine	203.12	109			
4081	C ₁₁ H ₁₃ N ₂ O	Benzylercatinine	203.12	225			
4082	C ₁₁ H ₁₃ N ₂ O ₄	2, 4, 6-Trinitro- <i>tert</i> -butyltoluene	283.12	97			
4083	C ₁₁ H ₁₄ ClNO ₂	Hydrastinine hydrochloride	243.57	210			
4084	C ₁₁ H ₁₄ N ₂	Calycanthine	174.12	243			
4085	C ₁₁ H ₁₄ N ₂	Isocalycanthine	174.12	235			
4086	C ₁₁ H ₁₄ N ₂ O	Cytisine	190.12	153			
4087	C ₁₁ H ₁₄ N ₂ O ₂	Antithermine (Acetopropionylphenylhydrazine)	206.12	108			1333
4088	C ₁₁ H ₁₄ O	Butyl phenyl ketone C ₆ H ₅ COC ₄ H ₉	162.11		239.5		
4089	C ₁₁ H ₁₄ O	Isobutyl phenyl ketone	162.11		225	0.967	
4090	C ₁₁ H ₁₄ O	Isopropyl benzyl ketone	162.11		237	0.985 ⁹	
4090 1	C ₁₁ H ₁₄ O	<i>p</i> -Methylbutyrophenone	162.11		252 ²⁹	1.026	683
4091	C ₁₁ H ₁₄ O	Propyl benzyl ketone	162.11		244	0.984 ⁹	
4091 1	C ₁₁ H ₁₄ O	2, 4, 6-Trimethylacetophenone	162.11		240.5 ²⁹	0.975	661
4092	C ₁₁ H ₁₄ O ₂	Eugenol methyl ether	178.11		249	1.055 ¹⁵	
4093	C ₁₁ H ₁₄ O ₂	Isoeugenol methyl ether	178.11		264	1.055	
4094	C ₁₁ H ₁₄ O ₂	<i>p</i> -Isopropylphenylacetic acid	178.11	52			
4095	C ₁₁ H ₁₄ O ₂	<i>n</i> -Butyl benzoate C ₆ H ₅ CO ₂ C ₄ H ₉	178.11	-22.4	250.3	1.000 ²⁰	
4096	C ₁₁ H ₁₄ O ₂	Benzyl butyrate C ₆ H ₅ CO ₂ CH ₂ C ₄ H ₉	178.11		240	1.016 ¹⁷	
4097	C ₁₁ H ₁₄ O ₂	Benzyl isobutyrate	178.11		228	1.016 ¹⁸	557
4097 1	C ₁₁ H ₁₄ O ₂	<i>d</i> - β -Butyl benzoate	178.11		120 ²⁰	1.000	563
4098	C ₁₁ H ₁₄ O ₂	Ethyl hydrocinnamate	178.11		249	1.015	571
4099	C ₁₁ H ₁₄ O ₂	Isobutyl benzoate	178.11		237	1.002 ¹⁵	
4100	C ₁₁ H ₁₄ O ₂	Phenyl isovalerate	178.11		226		
4101	C ₁₁ H ₁₄ O ₂	<i>n</i> -Butyl salicylate	194.11		155 ¹⁵		
4102	C ₁₁ H ₁₄ O ₂	Propyl anisate <i>p</i> -CH ₃ OC ₆ H ₄ CO ₂ C ₃ H ₇	194.11		176 ⁴⁵	1.09	653
4103	C ₁₁ H ₁₄ O ₂	Zingerone	194.11	41	188 ¹⁴		
4104	C ₁₁ H ₁₃ NO	<i>p</i> -Diethylaminobenzaldehyde	177.12	41	174 ⁷		
4105	C ₁₁ H ₁₃ NO	Isovaleroanilide	177.12	115			
4106	C ₁₁ H ₁₃ NO	<i>n</i> -Valeroanilide	177.12	49	267		
4107	C ₁₁ H ₁₃ NO ₂	<i>p</i> -Diethylaminobenzoic acid	193.12	193			
4108	C ₁₁ H ₁₃ NO ₂	Isobutyl <i>p</i> -aminobenzoate	193.12	65			
4109	C ₁₁ H ₁₃ NO ₂	Methylacetophenetidine	193.12	40	300		
4110	C ₁₁ H ₁₃ NO ₂	Triphenin	193.12	120			
4111	C ₁₁ H ₁₃ NO ₂	Anhalamine	209.12	188			
4112	C ₁₁ H ₁₃ NO ₂	Lactophenine	209.12	118			
4113	C ₁₁ H ₁₃ NO ₂	Methoxyacetophenetidin	209.12	98			
4114	C ₁₁ H ₁₃ NO ₂ S	Hydrastinine bisulfate	305.19	216			
4115	C ₁₁ H ₁₄	<i>n</i> -Amylbenzene CH ₃ (CH ₂) ₄ C ₆ H ₅	148.12		202.1	0.860	514
4116	C ₁₁ H ₁₄	<i>tert</i> -Amylbenzene	148.12		189.3	0.874 ¹⁵	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4117	C ₁₁ H ₁₆	3, 5-Diethyltoluene	148 12		200	0 879	
4118	C ₁₁ H ₁₆	Isoamylbenzene (CH ₃) ₂ CH(CH ₂) ₂ C ₆ H ₅	148 12		194	0 885	
4119	C ₁₁ H ₁₆	Pentamethylbenzene (CH ₃) ₅ C ₆ H	148 12	53	230	0 847 ^{107,8}	1152
4120	C ₁₁ H ₁₆	4-Propyl- <i>o</i> -xylene C ₆ H ₄ C ₃ H ₇ (CH ₃) ₂	148 12	< -20	209		
4121	C ₁₁ H ₁₆	4-Propyl- <i>m</i> -xylene C ₆ H ₄ C ₃ H ₇ (CH ₃) ₂	148 12	< -20	208 5		
4122	C ₁₁ H ₁₆	2-Propyl- <i>p</i> -xylene C ₆ H ₄ C ₃ H ₇ (CH ₃) ₂	148 12	< -20	207		
4123	C ₁₁ H ₁₆ Br ₂ N ₂ O ₂	<i>N</i> -2, 3-Dibromopropyl-5, 5-diethylbarbituric acid.....	383 97	125			
4124	C ₁₁ H ₁₆ ClNO ₂	Anhalamine hydrochloride	245 59	258			
4125	C ₁₁ H ₁₆ N ₂ O ₂	Pilocarpine	208 14	34			
4126	C ₁₁ H ₁₆ N ₂ O ₂	Isopilocarpine.....	208 14		261 ¹⁰		
4127	C ₁₁ H ₁₆ O	<i>p</i> -Isoamylphenol ..	164 12	93	255		
4128	C ₁₁ H ₁₆ O	Pentamethylphenol.	164 12	125	267		
4129	C ₁₁ H ₁₆ O	Benzyl <i>n</i> -butyl ether C ₆ H ₅ CH ₂ OC ₄ H ₉	164 12		216		
4130	C ₁₁ H ₁₆ O	Benzyl isobutyl ether	164 12		213	0 928 ^{10,8}	
4131	C ₁₁ H ₁₆ O	Phenyl isoamyl ether	164 12		225	0 920	545
4132	C ₁₁ H ₁₆ O	Thymyl methyl ether	164 12		210 2	0 954	
4133	C ₁₁ H ₁₇ BrN ₂ O ₂	Isopilocarpine hydrobromide	289 06	147			
4134	C ₁₁ H ₁₇ BrN ₂ O ₂	Pilocarpine hydrobromide	289 06	185			1333
4135	C ₁₁ H ₁₇ ClN ₂ O ₂	Isopilocarpine hydrochloride	244 61	127			
4136	C ₁₁ H ₁₇ ClN ₂ O ₂	Pilocarpine hydrochloride	244 61	196 7			1333
4137	C ₁₁ H ₁₇ N	<i>o</i> -Diethyltoluidine	163 14		206		
4138	C ₁₁ H ₁₇ N	<i>m</i> -Diethyltoluidine	163 14		228		
4139	C ₁₁ H ₁₇ N	<i>p</i> -Diethyltoluidine	163 14		229	0 924 ^{10,8}	
4140	C ₁₁ H ₁₇ N	Isoamylaniline.	163 14		254 5	0 928 ^{10,8}	
4141	C ₁₁ H ₁₇ NO ₂	Mescaline....	211 14	151			
4142	C ₁₁ H ₁₇ N ₂ O ₄	Isopilocarpine nitrate ..	271 16	159			
4143	C ₁₁ H ₁₇ N ₂ O ₄	Pilocarpine nitrate.	271 16	173			1333
4144	C ₁₁ H ₁₇ O ₂	Citronellyl formate	181 13		98 ¹¹	0 884	453
4145	C ₁₁ H ₁₈ N ₂ O ₂	5, 5- <i>n</i> -Butylisopropylbarbituric acid	226 16	210			
4146	C ₁₁ H ₁₈ N ₂ O ₂	5, 5-Isoamylethylbarbituric acid	226 16	156			
4147	C ₁₁ H ₁₈ O ₂	<i>d</i> -Bornyl formate	182 14		230	1.009	858
4148	C ₁₁ H ₁₈ O ₂	Geranyl formate	182 14		98 ¹¹	0.909	491
4149	C ₁₁ H ₁₈ O ₂	Isobornyl formate	182 14		100 ¹⁴	1.017 ¹⁵	
4150	C ₁₁ H ₁₈ O ₂	Methyl geranate	182 14		117 ¹⁴	0 922	961
4151	C ₁₁ H ₁₈ O ₂	<i>d</i> , α -Terpinyl formate	182 14		136 ¹⁰	0 999 ⁹	
4152	C ₁₁ H ₁₈ O ₄	Ethyl camphorate	214 14	87			
4153	C ₁₁ H ₁₈ O ₄	Diethyl ethylacetylmalonate	230 14		137.5 ²⁰	1 053	316
4154	C ₁₁ H ₁₈ N ₂ O	<i>d</i> -Camphor semicarbazone	209 17	238			
4155	C ₁₁ H ₂₀ O	Geranyl methyl ether	168 15		212		
4156	C ₁₁ H ₂₀ O	Methyl <i>d</i> -bornyl ether	168 15		195 3	0 916	1011
4157	C ₁₁ H ₂₀ O ₂	<i>l</i> -Menthyl formate	184 15	9	217	0 936	
4158	C ₁₁ H ₂₀ O ₂	Undecylenic acid	184 15	24 5	295	0 907	
4159	C ₁₁ H ₂₀ O ₂	Isoamyl ethylacetoacetate	200 15		236 d.	0 951 ^{10,8}	
4160	C ₁₁ H ₂₀ O ₄	Di- <i>n</i> -butyl malonate CH ₃ (CO ₂ C ₄ H ₉) ₂	216 15		251 5	1 005 ⁶	
4161	C ₁₁ H ₂₀ O ₄	Diethyl diethylmalonate	216 15		223	0.990	282
4162	C ₁₁ H ₂₀ O ₄	Isoamyl isopropyl malonate	216 15		140 ²⁴	0.958 ²⁴	314
4163	C ₁₁ H ₂₀ O ₄	Glycerol 1, 2-dibutyrate	232 15		282		
4164	C ₁₁ H ₂₁ NO ₂	Menthyl carbamate.....	199 17	165	>200 d.		
4165	C ₁₁ H ₂₂	α -Undecylene CH ₃ CH(CH ₃) ₄ CH ₃	154 17		188	0 763	
4166	C ₁₁ H ₂₂	β -Undecylene CH ₃ CH ₂ CH(CH ₃) ₂ CH ₃	154 17		193	0.774 ¹⁰	341
4167	C ₁₁ H ₂₂ N ₂ O ₄	Clavine.....	260 19	263			
4168	C ₁₁ H ₂₂ O	Methyl <i>l</i> -menthyl ether	170 17			0 861	
4169	C ₁₁ H ₂₂ O	Undecylic aldehyde	170 17	-4	117 ¹⁸	0 825 ²³	342
4170	C ₁₁ H ₂₂ O	Diamyl ketone (C ₄ H ₉) ₂ CO	170 17	14 6	226 3	0.826 ²⁰	
4171	C ₁₁ H ₂₂ O	Diisoamyl ketone.....	170 17		226		
4172	C ₁₁ H ₂₂ O	Methyl <i>n</i> -nonyl ketone....	170 17	12 1	228	0.826	312
4173	C ₁₁ H ₂₂ O ₂	Umbellulic acid.....	186 17	23	280		
4174	C ₁₁ H ₂₂ O ₂	Undecylic acid CH ₃ (CH ₂) ₁₀ CO ₂ H	186 17	29 3	228 ¹⁰⁰		1066
4175	C ₁₁ H ₂₂ O ₂	Ethyl pelargonate C ₆ H ₅ CO ₂ C ₂ H ₅	186 17	-44 5	219	0 866 ^{17,8}	
4176	C ₁₁ H ₂₂ O ₂	Methyl caprate C ₆ H ₁₃ CO ₂ CH ₃	186 17	-18	224		
4177	C ₁₁ H ₂₂ O ₂	Diisoamyl carbonate...	202 17		228 7	0.912 ¹⁵	
4178	C ₁₁ H ₂₄	<i>n</i> -Undecane CH ₃ (CH ₂) ₉ CH ₃	156 18	-26.5	197	0.741	234

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4178 1	C ₁₁ H ₂₄	1-Ethylnonane	156 18		71 ¹⁸	0.751 ¹⁸	371
4179	C ₁₁ H ₂₂ O	<i>n</i> -Undecyl alcohol CH ₃ (CH ₂) ₉ CH ₂ OH	172 19	19	146 ²⁰	0.833	
4179 1	C ₁₁ H ₂₂ O	<i>n</i> -Undecan-6-ol	172 19	16	235 ^{7,94}	0.833	
4180	C ₁₁ H ₂₄ N	<i>n</i> -Undecylamine CH ₃ (CH ₂) ₉ CH ₂ NH ₂	171 20	16 5	234		
4181	C ₁₂ H ₄ N ₂ O ₄	Dipicrylamine [2, 4, 6-(NO ₂) ₃ C ₆ H ₂] ₂ NH	439 10	250 d.			1192
4182	C ₁₂ H ₆ O ₁₂	Mellitic acid C ₆ (CO ₂ H) ₆	342 05	286			
4183	C ₁₂ H ₇ N ₃ O ₇	Phenyl picrate	305 08	153			
4184	C ₁₂ H ₄	Acenaphthylene	152 06	93	275		
4185	C ₁₂ H ₈ AsN	Phenarsazine	241 03	310			
4185 1	C ₁₂ H ₈ Br ₂	<i>p</i> , <i>p'</i> -Di-(bromophenyl)	311 89	164		1.897	
4186	C ₁₂ H ₈ Cl ₂	1, 2-Dichloracenaphthene	222 98	115			
4187	C ₁₂ H ₈ N ₂	Phenanthroline	180 08	78 5	>360		
4188	C ₁₂ H ₈ N ₂	Phenazine	180 08	171	>360		
4189	C ₁₂ H ₈ N ₂	Phenazone	180 08	156	>360		
4190	C ₁₂ H ₈ N ₂	Pseudophenanthroline	180 08	173			
4191	C ₁₂ H ₈ N ₂ O ₄	Dinitroacenaphthene	211 08	206 d.			
4192	C ₁₂ H ₈ N ₂ O ₄	<i>o</i> , <i>o'</i> -Dinitrodiphenyl	241 08	124			
4193	C ₁₂ H ₈ N ₂ O ₄	<i>m</i> , <i>m'</i> -Dinitrodiphenyl	241 08	198			
4194	C ₁₂ H ₈ N ₂ O ₄	<i>p</i> , <i>p'</i> -Dinitrodiphenyl	241 08	233			
4195	C ₁₂ H ₈ O	Diphenylene oxide	168 06	87	288		
4196	C ₁₂ H ₈ O ₂	2-Phenylbenzoquinone	184 06	107			
4197	C ₁₂ H ₈ O ₄	1, 8-Naphthalic acid	216 06	270			
4198	C ₁₂ H ₈ O ₄	Bergaptene	216 06	188			
4199	C ₁₂ H ₈ O ₄	Paracetom	216 06	152			
4200	C ₁₂ H ₈ O ₄	Xanthotoxin	216 06	146			
4201	C ₁₂ H ₈ S ₂	Thianthrene	216 19	160	366		
4202	C ₁₂ H ₈ AsClN	Phenarsazine chloride	277 50	193			
4203	C ₁₂ H ₈ Br	3-Bromocenaphthene	232 99	51 2	336 4	1.437 ⁴⁵	
4204	C ₁₂ H ₈ Cl	3-Chlorocenaphthene	188 53	69 8	319		
4205	C ₁₂ H ₈ Cl	<i>o</i> -Chlorodiphenyl <i>o</i> -ClC ₆ H ₄ C ₆ H ₅	188 53	34	268		
4206	C ₁₂ H ₈ Cl	<i>m</i> -Chlorodiphenyl <i>m</i> -ClC ₆ H ₄ C ₆ H ₅	188 53	89			
4207	C ₁₂ H ₈ Cl	<i>p</i> -Chlorodiphenyl <i>p</i> -ClC ₆ H ₄ C ₆ H ₅	188 52	75 5	282		
4208	C ₁₂ H ₈ ClN ₂	<i>m</i> -Chlorozobenzene	216 54	67 5			
4209	C ₁₂ H ₈ ClN ₂	<i>p</i> -Chlorozobenzene <i>p</i> -ClC ₆ H ₄ NNC ₆ H ₅	216 54	89			
4210	C ₁₂ H ₈ I	3-Iodocenaphthene	280 00	65	180 d.	1.674 ⁴²	1333
4211	C ₁₂ H ₈ N	Carbazole	167 08	244 8	354 8		
4212	C ₁₂ H ₈ NO ₂	<i>o</i> -Nitrodiphenyl <i>o</i> -NO ₂ C ₆ H ₄ C ₆ H ₅	199 08	37	320		
4213	C ₁₂ H ₈ NO ₂	<i>m</i> -Nitrodiphenyl <i>m</i> -NO ₂ C ₆ H ₄ C ₆ H ₅	199 08	61			
4214	C ₁₂ H ₈ NO ₂	<i>p</i> -Nitrodiphenyl <i>p</i> -NO ₂ C ₆ H ₄ C ₆ H ₅	199 08	113	340		
4215	C ₁₂ H ₈ NS	Thiodiphenylamine	199 14	180	371 d.		
4216	C ₁₂ H ₈ N ₃ O ₂	<i>p</i> -Nitrozobenzene	227 09	129 9			
4217	C ₁₂ H ₈ N ₃ O ₅	2, 4-Dinitro-1'-hydroxydiphenylamine	275 09	190			
4218	C ₁₂ H ₁₀	Acenaphthene	154 08	95	277 5	1.021 ^{92, 2}	1127, 1193 1105
4219	C ₁₂ H ₁₀	Diphenyl C ₆ H ₅ C ₆ H ₅	154 08	69 0	254 9	1.041	
4220	C ₁₂ H ₁₀ AsCl	Diphenyl arsine chloride	264 50	42 8	327 d.	1.583 ⁴⁰	
4221	C ₁₂ H ₁₀ As ₂	Arsenobenzene C ₆ H ₅ AsAsC ₆ H ₅	304 00	196			
4221 1	C ₁₂ H ₁₀ Cl	Diphenylchlorium chloride	316 47	d. 230		1.67	
4222	C ₁₂ H ₁₀ Cl ₂ N ₂	Dichlorobenzidine [2, 4-Cl(NH ₂) ₂ C ₆ H ₃] ₂	253 01	163			
4223	C ₁₂ H ₁₀ Cl ₂ N ₂	<i>p</i> , <i>p</i> -Dichlorobenzidine	253 01	60			
4224	C ₁₂ H ₁₀ N ₂	Arbine	182 09	237			
4225	C ₁₂ H ₁₀ N ₂	Azobenzene C ₆ H ₅ NNC ₆ H ₅	182 09	67	297 4	1.203	
4226	C ₁₂ H ₁₀ N ₂ O	Azoxybenzene	198 09	36		1.246	
4227	C ₁₂ H ₁₀ N ₂ O	<i>p</i> -Hydroxynazobenzene	198 09	152			
4228	C ₁₂ H ₁₀ N ₂ O	<i>N</i> -Nitrosodiphenylamine (C ₆ H ₅) ₂ NNO	198 09	66 5			1031
4229	C ₁₂ H ₁₀ N ₂ O	<i>p</i> -Nitrosophenylamine	198 09	143			
4230	C ₁₂ H ₁₀ N ₂ O ₂	<i>o</i> , <i>o'</i> -Azophenol	214 09	172			
4231	C ₁₂ H ₁₀ N ₂ O ₂	<i>m</i> , <i>m'</i> -Azophenol HOC ₆ H ₄ NNC ₆ H ₄ OH	214 09	205			
4232	C ₁₂ H ₁₀ N ₂ O ₂	<i>p</i> , <i>p'</i> -Azophenol	214 09	215			
4233	C ₁₂ H ₁₀ N ₂ O ₂	<i>o</i> -Nitrodiphenylamine	214 09	75			
4234	C ₁₂ H ₁₀ N ₂ O ₂	<i>p</i> -Nitrodiphenylamine	214 09	133			
4235	C ₁₂ H ₁₀ N ₂ O ₂ S	Benzidinesulfone	246 16	>350			
4236	C ₁₂ H ₁₀ N ₂ O ₃	<i>o</i> , <i>o'</i> -Azoxyphenol	288 17	102			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4237	C ₁₂ H ₁₀ N ₂ O ₂	<i>p, p'</i> -Azoxyphenol	288.17	156; 107			
4238	C ₁₂ H ₁₀ O	<i>o</i> -Phenylphenol C ₆ H ₅ C ₆ H ₄ OH	170.08	56	275		
4239	C ₁₂ H ₁₀ O	<i>m</i> -Phenylphenol C ₆ H ₅ C ₆ H ₄ OH	170.08	78	>300		
4240	C ₁₂ H ₁₀ O	<i>p</i> -Phenylphenol C ₆ H ₅ C ₆ H ₄ OH	170.08	165	308		
4241	C ₁₂ H ₁₀ O	Phenyl ether C ₆ H ₅ OC ₆ H ₅	170.08	26.9	259	1.072	1019
4242	C ₁₂ H ₁₀ OS	Diphenyl sulfoxide (C ₆ H ₅) ₂ SO	202.14	70.5	340		
4243	C ₁₂ H ₁₀ O ₂	<i>o, o'</i> -Diphenol OHC ₆ H ₄ C ₆ H ₄ OH	186.08	109	326		
4244	C ₁₂ H ₁₀ O ₂	<i>o, p'</i> -Diphenol OHC ₆ H ₄ C ₆ H ₄ OH	186.08	161	342		
4245	C ₁₂ H ₁₀ O ₂	<i>m, m'</i> -Diphenol OHC ₆ H ₄ C ₆ H ₄ OH	186.08	123.5			
4246	C ₁₂ H ₁₀ O ₂	<i>p, p'</i> -Diphenol OHC ₆ H ₄ C ₆ H ₄ OH	186.08	272			
4247	C ₁₂ H ₁₀ O ₂	α -Naphthyl acetate CH ₃ CO ₂ C ₁₀ H ₇	186.08	44.8			
4248	C ₁₂ H ₁₀ O ₂	β -Naphthyl acetate CH ₃ CO ₂ C ₁₀ H ₇	186.08	68.5			
4249	C ₁₂ H ₁₀ O ₂ S	Diphenyl sulfone (C ₆ H ₅) ₂ SO ₂	218.14	129	377.8		
4250	C ₁₂ H ₁₀ O ₂ S	Phenyl benzenesulfonate	234.14	35			
4251	C ₁₂ H ₁₀ O ₄	2, 2'-Diresorcinol	218.08	268			
4252	C ₁₂ H ₁₀ O ₄	4, 4'-Diresorcinol	218.08	222			
4253	C ₁₂ H ₁₀ O ₄	5, 5'-Diresorcinol	218.08	310			
4254	C ₁₂ H ₁₀ O ₄	Piperic acid	218.08	217	220 d.		
4255	C ₁₂ H ₁₀ O ₄	Quinhydrone	218.08	171			
4256	C ₁₂ H ₁₀ O ₄ S	4, 4'-Dihydroxydiphenylsulfone	250.14	239			
4257	C ₁₂ H ₁₀ O ₄	Paracetoic acid	234.08	108			
4258	C ₁₂ H ₁₀ O ₄ S ₂	Benzenesulfone anhydride	298.21	90	210 ¹⁰ d		
4259	C ₁₂ H ₁₀ P ₂	Phosphobenzene C ₆ H ₅ P ₂ PC ₆ H ₅	216.13	119			
4260	C ₁₂ H ₁₀ S	Diphenyl sulfide (C ₆ H ₅) ₂ S	186.14		293	1.119 ¹⁴	948
4261	C ₁₂ H ₁₀ S ₂	Diphenyl disulfide (C ₆ H ₅) ₂ S ₂	218.21	61	310		
4262	C ₁₂ H ₁₀ Se	Diphenyl selenide (C ₆ H ₅) ₂ Se	233.28		302	1.356 ¹⁵	
4263	C ₁₂ H ₁₀ Te	Diphenyl telluride (C ₆ H ₅) ₂ Te	281.58		320	1.556 ¹⁶	800
4264	C ₁₂ H ₁₀ As	Diphenylarsene (C ₆ H ₅) ₂ AsH	230.05		155 ¹⁷		
4265	C ₁₂ H ₁₀ AsO ₂	Diphenylarsonic acid (C ₆ H ₅) ₂ AsOOH	262.05	178			
4266	C ₁₂ H ₁₁ N	<i>o</i> -Aminodiphenyl C ₆ H ₅ C ₆ H ₄ NH ₂	169.09	45.5	299		
4267	C ₁₂ H ₁₁ N	2-Benzylpyridine	169.09		276		
4268	C ₁₂ H ₁₁ N	3-Benzylpyridine	169.09	34	286		
4269	C ₁₂ H ₁₁ N	4-Benzylpyridine	169.09		287		
4270	C ₁₂ H ₁₁ N	Diphenylamine (C ₆ H ₅) ₂ NH	169.09	53	302	1.159	1333
4271	C ₁₂ H ₁₁ NO	<i>m</i> -Phenylaminophenol	185.09	82	340		
4272	C ₁₂ H ₁₁ NO ₂ S	Benzenesulfamylide	233.16	110			1183
4273	C ₁₂ H ₁₁ N ₃	<i>m</i> -Aminonazobenzene	197.11	59			
4274	C ₁₂ H ₁₁ N ₃	<i>p</i> -Aminonazobenzene C ₆ H ₅ N ₂ C ₆ H ₄ NH ₂	197.11	126	>360		
4275	C ₁₂ H ₁₁ N ₃	Diazoaminobenzene C ₆ H ₅ N ₂ NHC ₆ H ₅	197.11	96	exp.		
4276	C ₁₂ H ₁₁ N ₃ O ₂	<i>o</i> -Nitrobenzidine	229.11	143			
4277	C ₁₂ H ₁₁ N ₃ O ₂	<i>m</i> -Nitrobenzidine	229.11	190			
4278	C ₁₂ H ₁₁ P	Diphenylphosphine (C ₆ H ₅) ₂ PH	186.11		280	1.071 ⁸	
4279	C ₁₂ H ₁₂	1, 4-Dimethylnaphthalene	156.09	<-18	264.3	1.016	900
4280	C ₁₂ H ₁₂	2, 3-Dimethylnaphthalene	156.09		266		
4281	C ₁₂ H ₁₂	2, 6-Dimethylnaphthalene	156.09	111			
4282	C ₁₂ H ₁₂	α -Ethylnaphthalene	156.09	<-14	258 d.	1.064 ¹⁸	
4283	C ₁₂ H ₁₂	β -Ethylnaphthalene	156.09	-19	251	1.008 ⁹	
4284	C ₁₂ H ₁₂ ClN	Diphenylamine hydrochloride	205.56				1333
4285	C ₁₂ H ₁₂ N ₂	<i>p</i> -Aminodiphenylamine	184.11	75	354		
4286	C ₁₂ H ₁₂ N ₂	Benzidine (<i>p</i> -NH ₂ C ₆ H ₄) ₂	184.11	128.7	401.7		
4287	C ₁₂ H ₁₂ N ₂	β -Benzidine	184.11	45	363		
4288	C ₁₂ H ₁₂ N ₂	1, 1-Diphenylhydrazine (C ₆ H ₅) ₂ NNH ₂	184.11	36	220 ¹⁹		
4289	C ₁₂ H ₁₂ N ₂	Hydrazobenzene C ₆ H ₅ NHNHC ₆ H ₅	184.11	131	d.		
4290	C ₁₂ H ₁₂ N ₂ O	Harmalol,	200.11	212 d.			
4291	C ₁₂ H ₁₂ N ₂ O ₂	Luminal (5,5-Phenylethyl)barbituric acid	232.11	173			
4292	C ₁₂ H ₁₂ N ₂ O ₂ S ₂	Benzene- <i>o, o'</i> -disulfone acid	344.24	>175 d.			
4293	C ₁₂ H ₁₂ N ₄	Chrysoidine,	212.12	117.5			1333
4294	C ₁₂ H ₁₂ N ₄	<i>p, p'</i> -Diaminonazobenzene	212.12	241			
4295	C ₁₂ H ₁₂ N ₄ O ₄	Urocanic acid,	276.12	213 d.			
4296	C ₁₂ H ₁₂ O	Ethyl α -naphthyl ether	172.09	5.5	276.4	1.061	770
4297	C ₁₂ H ₁₂ O	Ethyl β -naphthyl ether	172.09	37.5	282	1.064	1071
4297.1	C ₁₂ H ₁₂ O	<i>l</i> -Methyl- α -naphthyl carbanol	172.09	47	116 ¹¹	1.115	
4298	C ₁₂ H ₁₂ O ₂	Benzylideneacetylacetone	188.09		188 ¹²		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4299	C ₁₅ H ₁₃ O ₂	Allyl cinnamate	188.09		286 d.	1.052 ²⁰ ₁₅	
4300	C ₁₅ H ₁₃ O ₂	Benzoylacetylacetone	204.09	35	167 ²¹	1.152 ¹⁵ ₁₀	
4301	C ₁₅ H ₁₃ O ₄	Brasilic acid	252.09	129			
4302	C ₁₅ H ₁₃ O ₄	Phloroglucinol triacetate	252.09	106			
4303	C ₁₅ H ₁₃ O ₄	Pyrogallol triacetate	252.09	165			
4304	C ₁₅ H ₁₃ N	Dimethyl- α -naphthylamine	171.11		276	1.045 ¹⁵ ₁₀	810
4305	C ₁₅ H ₁₃ N	Dimethyl- β -naphthylamine	171.11	46	305	1.028 ²² ₁₅	1081
4306	C ₁₅ H ₁₃ N	Ethyl α -naphthylamine	171.11		176 ¹⁵	1.060	871
4307	C ₁₅ H ₁₃ N	Ethyl β -naphthylamine	171.11		183 ¹⁵	1.057	969
4308	C ₁₅ H ₁₃ N	2, 6, 8-Trimethylquinoline	171.11	46	261.4		
4309	C ₁₅ H ₁₃ NO ₃	Pyranthin	219.11	155			
4310	C ₁₅ H ₁₃ N ₃	<i>p</i> , <i>p'</i> -Diaminodiphenylamine	199.12	158			
4311	C ₁₅ H ₁₄ As ₂ Cl ₂ N ₂ O ₂	Arsphenamine	438.96	160 d.			
4312	C ₁₅ H ₁₄ N	Quinaldine ethiodide	299.05	234			
4313	C ₁₅ H ₁₄ N ₂ O	<i>p</i> -Tolylantipyrine	202.12	137			
4314	C ₁₅ H ₁₄ N ₂ O ₂ S ₂	Benzidine- <i>o</i> , <i>o'</i> -disulfoneamide	342.27	278			
4315	C ₁₅ H ₁₄ N ₂ O ₄	Desoxyamalic acid	310.14	260 s. d.			
4316	C ₁₅ H ₁₄ N ₂ O ₄	Amalic acid (Tetramethylalloxantine)	342.14	221 d.			
4317	C ₁₅ H ₁₄ O ₂	<i>n</i> -Propyl cinnamate	190.11		285.1	1.044 ⁰	
4318	C ₁₅ H ₁₄ O ₂	Eugenol acetate	206.11	31	282.4	1.084	665
4318.1	C ₁₅ H ₁₄ O ₂	Ethyl <i>p</i> -methoxycinnamate	206.11	52			1232
4319	C ₁₅ H ₁₄ O ₂	Isoeugenol acetate	206.11	80	283		
4322	C ₁₅ H ₁₄ O ₄	Apiol	222.11	29.5	294	1.015	1310
4323	C ₁₅ H ₁₄ O ₄	Isapiol	222.11	56	304	1.197 ¹⁵	817
4324	C ₁₅ H ₁₄ O ₄	Diethyl <i>o</i> -phthalate α -C ₆ H ₄ (CO ₂ C ₂ H ₅) ₂	222.11		296.1	1.122	607
4325	C ₁₅ H ₁₃ N	Carbazoline	173.12	99	297		
4326	C ₁₅ H ₁₃ N	Diallylamine C ₆ H ₅ N(CH ₂ CH=CH ₂) ₂	173.12		245	0.954	
4327	C ₁₅ H ₁₃ N	Julolidine	173.12	40	280		
4328	C ₁₅ H ₁₃ NO	Benzoylpiperidine	189.12	48	184 ¹⁷		
4329	C ₁₅ H ₁₃ NO	Naphthalanmorpholine	189.12	63	312		
4330	C ₁₅ H ₁₃ NO ₂	Dipropionamide C ₆ H ₅ N(OCC ₂ H ₅) ₂	205.12	44	179.5 ³⁰		
4330.1	C ₁₅ H ₁₃ NO ₂	Ethyl phenacetate	221.12	79			1280
4331	C ₁₅ H ₁₃ NO ₂	Anhalonidine	221.12	160			
4332	C ₁₅ H ₁₃ NO ₂	Anhalonine	221.12	85.5			
4333	C ₁₅ H ₁₃ NO ₂	Hydrocotarnine	221.12	55	100 d.		
4334	C ₁₅ H ₁₃ NO ₄	Cotarnine	237.12	133			
4335	C ₁₅ H ₁₃ N ₂ O	Methyleytusine (Caulophylline)	204.14	137			
4336	C ₁₅ H ₁₃ N ₂ O ₂ S	Aniline sulfate (C ₆ H ₅ NH ₂) ₂ H ₂ SO ₄	284.20			1.377 ⁴	
4337	C ₁₅ H ₁₄ O	Isoamyl phenyl ketone	176.12		242.5		
4338	C ₁₅ H ₁₄ O	Isobutyl benzyl ketone	176.12		250.5	0.969 ⁰	
4339	C ₁₅ H ₁₄ O ₂	Eugenol ethyl ether	192.12		254	1.021 ¹⁵	808
4340	C ₁₅ H ₁₄ O ₂	Isoeugenol ethyl ether	192.12	64			
4341	C ₁₅ H ₁₄ O ₂	Pentamethylbenzoic acid	192.12	210.5			
4342	C ₁₅ H ₁₄ O ₂	Amly benzoate C ₆ H ₅ CO ₂ C ₆ H ₁₁	192.12		d.	0.989	566
4343	C ₁₅ H ₁₄ O ₂	Benzyl isovalerate	192.12		136 ²⁵		
4344	C ₁₅ H ₁₄ O ₂	Benzyl <i>d</i> -valerate	192.12		250 ¹³⁰	0.982 ²²	558
4345	C ₁₅ H ₁₄ O ₂	Isoamyl benzoate	192.12		262	0.993	
4345.1	C ₁₅ H ₁₄ O ₂	Isopropyl hydrocinnamate	192.12		126 ¹¹	0.986 ²⁵	
4346	C ₁₅ H ₁₄ O ₂	Thymyl acetate	192.12		243	1.009 ⁰	
4347	C ₁₅ H ₁₄ O ₂	<i>n</i> -Amly salicylate α -HOC ₆ H ₄ CO ₂ C ₆ H ₁₁	208.12		265	1.065 ¹⁵	
4348	C ₁₅ H ₁₄ O ₂	Butyl ansate p -CH ₃ OC ₆ H ₄ CO ₂ C ₄ H ₉	208.12		183 ¹⁰	1.054	635
4349	C ₁₅ H ₁₄ O ₂	Isoamyl salicylate	208.12		273	1.045 ¹⁵ ₁₀	
4350	C ₁₅ H ₁₄ O ₂	Isobutyl ansate	208.12		170 ¹⁴	1.052	634
4351	C ₁₅ H ₁₄ O ₂	Guaiacyl valerate C ₆ H ₅ CO ₂ C ₆ H ₄ OMe	208.12		265		
4352	C ₁₅ H ₁₄ O ₂	Asaron	208.12	67	296	1.165	1333
4353	C ₁₅ H ₁₄ O ₂	Elemicin	208.12		147 ¹⁰	1.063	694
4354	C ₁₅ H ₁₄ O ₂	Aspidinol	224.12	161			
4355	C ₁₅ H ₁₄ O ₂	Diethyl succinylsuccinate	256.12	128			
4356	C ₁₅ H ₁₄ O ₂	<i>d</i> , β -Phenylglucoside	256.12	175			
4357	C ₁₅ H ₁₄ O ₂	Arbutin	272.12	195			1333
4358	C ₁₅ H ₁₇ AsN ₃ O ₄	Aniline arsenate (C ₆ H ₅ NH ₂) ₂ H ₂ AsO ₄	328.11	140			
4359	C ₁₅ H ₁₇ NO	<i>N</i> - <i>n</i> -Butylacetanilide	191.14		276.5		
4360	C ₁₅ H ₁₇ NO	Capronilide (CH ₃ (CH ₂) ₄ CONHC ₆ H ₅)	191.14	95			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4361	C ₁₂ H ₁₇ NO	<i>C</i> -Diethylacetanilide	191 14	124			
4362	C ₁₂ H ₁₇ NO ₂	Ethyl- <i>N</i> -phenacetine	207 14	38	298		
4363	C ₁₂ H ₁₇ NO ₂	Ethyl- <i>o</i> -tolylurethane	207 14		255		
4364	C ₁₂ H ₁₇ N ₂ O ₃	Lysine picrate . . .	375 17	252 d			
4365	C ₁₂ H ₁₈	Hexamethylbenzene	162 14	166	265		
4365.1	C ₁₂ H ₁₈	1-Methyl-3- <i>tert</i> -amylbenzene	162 14		208	0.8673	
4366	C ₁₂ H ₁₈	1, 2, 4-Triethylbenzene	162 14		218	0.882	583
4367	C ₁₂ H ₁₈	1, 3, 5-Triethylbenzene	162 14		218	0.863	565
4367.1	C ₁₂ H ₁₈ N ₂ O ₄	Rhamnose phenylhydrazone	254 16	159			
4367.2	C ₁₂ H ₁₈ N ₂ O ₄	<i>d</i> , α -Glucosephenylhydrazone	270 16	160			
4367.3	C ₁₂ H ₁₈ N ₂ O ₄	<i>d</i> , β -Glucosephenylhydrazone	270 16	141			
4367.4	C ₁₂ H ₁₈ N ₂ O	Phenylhydrazine hydrate	234 17	24			
4367.5	C ₁₂ H ₁₈ N ₄ O ₃	Hexamethylenetetraminesorcinol.	250 17	200 d			
4367.6	C ₁₂ H ₁₈ O	Benzyl isoamyl ether.	178 14		237 5		
4367.7	C ₁₂ H ₁₈ O	Thymyl ethyl ether.	178.14		226 9	0.933 ⁰	
4367.8	C ₁₂ H ₁₈ O	Mellithyl alcohol (C ₆ H ₅) ₂ C ₆ H ₄ OH	178 14	160 5			
4367.9	C ₁₂ H ₁₈ O ₂	Phloroglucinol triethyl ether	210 14	43	175 ²⁴		
4368	C ₁₂ H ₁₈ O ₂	Pyrogallol triethyl ether	210 14	39			
4368.1	C ₁₂ H ₁₈ O ₄	Cascarillin.	226 14	205			
4368.2	C ₁₂ H ₁₈ O ₆	Trimeric diacetyl	258 14	105	280 1		
4368.3	C ₁₂ H ₁₈ O ₆	Diethyl 1, 1'-diacetylsuccinate	258.14	88		1.200 (st.)	1196,
						1.176 (met.)	1201
4368.4	C ₁₂ H ₁₈ O ₆	Triethyl aconitate . .	258 14		253 ⁷⁸⁰	1.106	454
4368.41	C ₁₂ H ₁₈ O ₄	Diethyl diacetyltartrate	290 14	68	170 ¹³	1.109 ⁷¹	
4368.5	C ₁₂ H ₁₈ Br ₂ O ₂	Bromal <i>d</i> -borneolate.	434 89	109		1.868 ⁰	
4368.6	C ₁₂ H ₁₈ ClO ₂	<i>d</i> -Bornyl chloroacetate	230 60		147 ³⁰		
4368.7	C ₁₂ H ₁₈ Cl ₂ O ₂	Chloral- <i>d</i> -borneolate	301 52	56			
4368.8	C ₁₂ H ₁₉ N	<i>n</i> -Dipropylaniline C ₆ H ₅ N(C ₃ H ₇) ₂	177 15		241	0.910	
4368.9	C ₁₂ H ₂₀ N ₂ O ₂	Isoamylisopropylbarbituric acid	240 17	175			
4369	C ₁₂ H ₂₀ N ₂ O ₂	Isoamylpropylbarbituric acid .	270 17	132			
4369.1	C ₁₂ H ₂₀ N ₄ O ₇	Hexamethylenetetraminemethylene citrate	332 19	175			
4369.2	C ₁₂ H ₂₀ O	Ballanophorin.	180 15	56			
4370	C ₁₂ H ₂₀ O	Homophorone	180 15		210 ²²⁸	0.886	530
4371	C ₁₂ H ₂₀ O ₂	Geranylacetic acid	196 15		179 ¹⁹	0.938	516
4372	C ₁₂ H ₂₀ O ₂	<i>dl</i> -Bornyl acetate	196 15		114 ²²	0.985	483
4373	C ₁₂ H ₂₀ O ₂	<i>d</i> -Bornyl acetate	196 15	29	226	0.991 ¹⁴	994
4374	C ₁₂ H ₂₀ O ₂	Geranyl acetate	196 15		242	0.917 ¹⁴	493
4375	C ₁₂ H ₂₀ O ₂	Isobornyl acetate	196 15		89 ⁹	0.981	1010
4375.1	C ₁₂ H ₂₀ O ₂	Isopulegyl acetate	196 15		103 ¹⁴	0.935 ¹⁴	934
4376	C ₁₂ H ₂₀ O ₂	<i>l</i> -Linalyl acetate	196 15		220	0.895	414
4377	C ₁₂ H ₂₀ O ₂	Neryl acetate	196 15		134 ²⁵	0.916 ¹⁴	
4378	C ₁₂ H ₂₀ O ₂	<i>dl</i> , α -Terpinyl acetate	196 15	< -50	220 d.	0.957	
4379	C ₁₂ H ₂₀ O ₂	<i>d</i> (<i>l</i>), α -Terpinyl acetate	196 15		140 ⁴⁰	0.983 ⁰	
4380	C ₁₂ H ₂₀ O ₄	Diethyl 1-ethyl-1'-acetylsuccinate	244 15		263	1.064 ¹⁵ , ₁₇	
4381	C ₁₂ H ₂₀ O ₇	Triethyl citrate	276 15		294	1.137	409
4382	C ₁₂ H ₂₀ O ₁₀	Maltosan	324 15	150 (?)			
4383	C ₁₂ H ₂₁ ClO ₂	<i>l</i> -Menthyl chloroacetate	232 62	38	137 ¹²	1.056	
4384	C ₁₂ H ₂₁ N ₃	Kyanpropine.	207.19	116			
4385	C ₁₂ H ₂₂ O	Ethyl <i>d</i> -bornyl ether	182 17		205	0.901	1023
4386	C ₁₂ H ₂₂ O	Hexenyl ether	182 17		118		
4387	C ₁₂ H ₂₂ O ₂	<i>d</i> -Citronellyl acetate	198 17		121 ¹⁵	0.903 ¹⁴	402
4388	C ₁₂ H ₂₂ O ₂	<i>l</i> -Menthyl acetate (HOCHCO ₂ (C ₆ H ₅) ₂)	198.17		227	0.919	418
4389	C ₁₂ H ₂₂ O ₃	Lanolic acid.	214.17	77			
4390	C ₁₂ H ₂₂ O ₃	<i>l</i> -Menthyl glycollate	214 17	87			
4391	C ₁₂ H ₂₂ O ₄	Diisoamyl oxalate	230 17		265	0.968 ¹¹	
4392	C ₁₂ H ₂₂ O ₄	Di- <i>n</i> -butyl <i>d</i> -tartrate	262.17	22 5	203 ¹⁴	1.098 ¹⁴	
4393	C ₁₂ H ₂₂ O ₄	Diisobutyl <i>d</i> -tartrate	262.17	69	325		
4393.1	C ₁₂ H ₂₂ O ₄	Diisobutyl <i>l</i> -tartrate	262.17	74	185 ²¹	1.020 ⁷⁹	
4394	C ₁₂ H ₂₂ O ₁₁	Lactose	342.17	201 6	d.		1229
4395	C ₁₂ H ₂₂ O ₁₁ (H ₂ O)	Maltose	360 19			1.540	1333
4396	C ₁₂ H ₂₂ O ₁₁	Saccharose	342.17	186		1.588 ¹⁴	1242
4397	C ₁₂ H ₂₂ O ₁₁	Trehalose (2H ₂ O)	342.17	210			1195

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4398	C ₁₂ H ₂₅ ClO	Lauryl chloride CH ₃ (CH ₂) ₁₀ COCl	218 64	-17	145 ¹⁸		
4399	C ₁₂ H ₂₅ N	Lauroitrile CH ₃ (CH ₂) ₁₀ CN	181 19	4	198 ¹⁰⁰	0.827 ¹⁸	
4400	C ₁₂ H ₂₄	<i>n</i> -Dodecylene CH ₂ :CH(CH ₂) ₉ CH ₃	168 19	-31 5	96 ¹⁵	0.762 ¹⁸	
4401	C ₁₂ H ₂₄ N ₂ O ₁₀	<i>d</i> -Glucosaldazine	356 20	100			
4402	C ₁₂ H ₂₄ O	<i>n</i> -Amyl hexyl ketone C ₅ H ₁₁ COC ₆ H ₁₃	184 19	9	112 ⁹		
4403	C ₁₂ H ₂₄ O	Ethylmenthol	184 19		85 ⁴	0.904 ¹⁷	
4404	C ₁₂ H ₂₄ O	<i>l</i> -Ethyl menthyl ether	184 19		212 9	0.854	918
4405	C ₁₂ H ₂₄ O	Lauric aldehyde CH ₃ (CH ₂) ₁₀ CHO	184 19	44 5	185 ¹⁰⁰		
4406	C ₁₂ H ₂₄ O ₂	Lauric acid CH ₃ (CH ₂) ₁₀ CO ₂ H	200 19	48 0	225 ¹⁰⁰	0.883	1123
4407	C ₁₂ H ₂₄ O ₂	<i>n</i> -Decyl acetate CH ₃ CO ₂ C ₁₀ H ₂₁	200 19		191 5		1082
4408	C ₁₂ H ₂₄ O ₂	Ethyl <i>n</i> -caprate C ₅ H ₁₁ CO ₂ C ₆ H ₁₃	200 19		245	0.862	
4409	C ₁₂ H ₂₄ O	<i>n</i> -Parabutyraldehyde	216 19		100 ⁹⁵		
4410	C ₁₂ H ₂₅ NO	Lauramide CH ₃ (CH ₂) ₁₀ CONH ₂	199 20	102	200 ^{12 5}		
4411	C ₁₂ H ₂₆	<i>n</i> -Dodecane CH ₃ (CH ₂) ₁₀ CH ₃	170 20	-12	216	0.768	255
4412	C ₁₂ H ₂₆	5-Propylnonane (C ₆ H ₅) ₂ CHC ₃ H ₇	170 20		205	0.756	268
4413	C ₁₂ H ₂₆	2, 4, 5, 7-Tetramethyloctane	170 20		210		
4414	C ₁₂ H ₂₆ O	<i>n</i> -Amylhexyl carbinol	186 20	30	119 ⁹		
4415	C ₁₂ H ₂₆ O	<i>n</i> -Dodecyl alcohol CH ₃ (CH ₂) ₁₀ CH ₂ OH	186 20	24	259	0.831	
4416	C ₁₂ H ₂₆ O	<i>n</i> -Hexyl ether (C ₆ H ₁₃) ₂ O	186 20		208 8		
4417	C ₁₂ H ₂₇ N	Dodecylamine C ₁₂ H ₂₅ NH ₂	185 22	28	135 ¹⁵		
4418	C ₁₂ H ₂₇ N	Tri- <i>n</i> -butylamine (C ₄ H ₉) ₃ N	185 22		214	0.778 ²⁰	
4419	C ₁₂ H ₂₇ N	Trisobutylamine [(CH ₃) ₂ CHCH ₂] ₃ N	185 22	-21 8	191 5	0.766 ²²	294
4420	C ₁₂ H ₂₈ N ₂ O ₄	Ethylenechamine isovalerate	264 23	129			
4421	C ₁₂ H ₇ Br ₂ O ₃	Tribromosalol	450 80	195			
4422	C ₁₂ H ₈ Cl ₂ O	<i>p</i> , <i>p'</i> -Dichlorobenzophenone	250 98	145			
4423	C ₁₂ H ₈ N ₂ O ₄	<i>p</i> , <i>p'</i> -Dinitrobenzophenone	272 08	190			
4424	C ₁₂ H ₈ N ₄ O ₆	<i>o</i> , <i>o'</i> , <i>p</i> , <i>p'</i> -Tetraamitrodiphenylurea	392 11	189			
4425	C ₁₂ H ₈ O	Fluorenone	180 06	84	341 5		
4426	C ₁₂ H ₈ O	Pyrene ketone	180 06	142			
4427	C ₁₂ H ₈ O ₂	Xanthone	196 06	174	351		
4428	C ₁₂ H ₈ O ₂ S	Benzophenonesulfone	244 13	187			
4429	C ₁₂ H ₈ O ₄	Euxanthone	228 06	240			
4430	C ₁₂ H ₇ BrO ₂	<i>p</i> -(<i>p</i> -Bromophenyl) benzoic acid	276 99	194			
4431	C ₁₂ H ₇ ClO	<i>o</i> -Chlorobenzophenone	216 53	45 5	330		
4432	C ₁₂ H ₇ ClO	<i>m</i> -Chlorobenzophenone	216 53	83			
4433	C ₁₂ H ₇ ClO	<i>p</i> -Chlorobenzophenone	216 53	78	> 300		
4434	C ₁₂ H ₇ N	Acridine	179 08	108	346		
4435	C ₁₂ H ₇ N	α -Naphthoquinoline	179 08	52	351		
4436	C ₁₂ H ₇ N	β -Naphthoquinoline	179 08	93	351		
4437	C ₁₂ H ₇ N	Phenanthradine	179 08	104	360		
4438	C ₁₂ H ₇ NO	9-Acridone	195 08	354			
4439	C ₁₂ H ₁₀	Fluorene	166 08	116	295		
4440	C ₁₂ H ₁₀ AsN	Diphenylcyanarsane (C ₆ H ₅) ₂ AsCN...	255 05	30			
4441	C ₁₂ H ₁₀ Cl ₂	Benzophenone chloride	236 99		305	1.235 ^{18 5}	
4442	C ₁₂ H ₁₀ Cl ₂	<i>m</i> , <i>m'</i> -Dichlorodiphenylmethane	236 99	8	318	1.234 ²¹	
4443	C ₁₂ H ₁₀ Cl ₂	<i>p</i> , <i>p'</i> -Dichlorodiphenylmethane	236 99	55	210 ¹⁵		
4444	C ₁₂ H ₁₀ N ₂ O ₂	Benzeneazosalicylic acid	242 09	218 d.			
4445	C ₁₂ H ₁₀ O	<i>p</i> -Diphenylaldehyde <i>p</i> -C ₆ H ₅ C ₆ H ₄ CHO	182 08	60			
4446	C ₁₂ H ₁₀ O	Fluorenol	182 08	156			
4447	C ₁₂ H ₁₀ O	α -Benzophenone (C ₆ H ₅) ₂ C=O	182 08	48 5	305 4	1.083 ^{53 6}	
4448	C ₁₂ H ₁₀ O	β -Benzophenone	182 08	26 5	306	1.108 ²²	1014
4449	C ₁₂ H ₁₀ O	γ -Benzophenone	182 08	45 48			
4450	C ₁₂ H ₁₀ O	δ -Benzophenone	182 08	-51			
4451	C ₁₂ H ₁₀ O	Xanthene	182 08	100.5	315		
4452	C ₁₂ H ₁₀ O ₂	<i>o</i> -Hydroxybenzophenone	198 08	41	250 ²⁰		
4453	C ₁₂ H ₁₀ O ₂	<i>m</i> -Hydroxybenzophenone	198 08	116			
4454	C ₁₂ H ₁₀ O ₂	<i>p</i> -Hydroxybenzophenone	198 08	134			
4455	C ₁₂ H ₁₀ O ₂	<i>o</i> -Phenylbenzoic acid	198 08	111	344		
4456	C ₁₂ H ₁₀ O ₂	<i>m</i> -Phenylbenzoic acid	198 08	161			
4457	C ₁₂ H ₁₀ O ₂	<i>p</i> -Phenylbenzoic acid	198 08	219			
4458	C ₁₂ H ₁₀ O ₂	Phenyl benzoate C ₆ H ₅ CO ₂ C ₆ H ₅	198 08	70	314	1.235 ²¹	
4459	C ₁₂ H ₁₀ O ₃	2, 5-Dihydroxybenzophenone	214 08	122			
4460	C ₁₂ H ₁₀ O ₄	2, 2'-Dihydroxybenzophenone	214.08	59	340		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4461	C ₁₃ H ₁₀ O ₂	2, 3'-Dihydroxybenzophenone	214.08	126			
4462	C ₁₃ H ₁₀ O ₂	2, 4'-Dihydroxybenzophenone	214.08	144			
4463	C ₁₃ H ₁₀ O ₂	3, 4'-Dihydroxybenzophenone	214.08	197			
4464	C ₁₃ H ₁₀ O ₂	4, 4'-Dihydroxybenzophenone	214.08	210			
4465	C ₁₃ H ₁₀ O ₂	<i>o</i> -Phenoxybenzoic acid	214.08	114.5	355 d.		
4466	C ₁₃ H ₁₀ O ₂	Diphenyl carbonate (C ₆ H ₅ O) ₂ C=O	214.08	81	302		
4467	C ₁₃ H ₁₀ O ₂	Salol <i>o</i> -HOC ₆ H ₄ CO ₂ C ₆ H ₅	214.08	43	173 ^{1*}	1.250	
4468	C ₁₃ H ₁₀ O ₄	2, 6, 2'-Trihydroxybenzophenone	230.08	133			
4469	C ₁₃ H ₁₀ O ₄	Pimpinellin	246.08	119			
4470	C ₁₃ H ₁₀ O ₄	Maclurin	262.08	220 d.			
4471	C ₁₃ H ₁₀ O ₄	Sordidin	294.08	210			
4472	C ₁₃ H ₁₀ S	Thiobenzophenone (C ₆ H ₅) ₂ CS	198.14	146.5			
4473	C ₁₃ H ₁₁ N	Benzylideneaniline C ₆ H ₅ N=CHC ₆ H ₅	181.09	54	300		
4474	C ₁₃ H ₁₁ N	5, 10-Dihydroacridine	181.09	169			
4475	C ₁₃ H ₁₁ NO	<i>o</i> -Aminobenzophenone	197.09	108			
4476	C ₁₃ H ₁₁ NO	<i>m</i> -Aminobenzophenone	197.09	86			
4477	C ₁₃ H ₁₁ NO	<i>p</i> -Aminobenzophenone	197.09	124			
4478	C ₁₃ H ₁₁ NO	Benzanilide C ₆ H ₅ NHCOOC ₆ H ₅	197.09	161		1.321 ⁴	
4479	C ₁₃ H ₁₁ NO	Benzophenoneoxime (C ₆ H ₅) ₂ C=NOH	197.09	142			
4480	C ₁₃ H ₁₁ NO	<i>N</i> -Phenylformanilide (C ₆ H ₅) ₂ NOCH ₂	197.09	74	220	1.230	
4481	C ₁₃ H ₁₁ NO ₂	<i>o</i> -Benzoylaminophenol	213.09	167 d.			
4482	C ₁₃ H ₁₁ NO ₂	<i>m</i> -Benzoylaminophenol	213.09	174			
4483	C ₁₃ H ₁₁ NO ₂	<i>p</i> -Benzoylaminophenol	213.09	227			
4484	C ₁₃ H ₁₁ NO ₂	<i>p</i> -Nitrodiphenylmethane	213.09	31			
4485	C ₁₃ H ₁₁ NO ₂	Salicylanilide <i>o</i> -OHC ₆ H ₄ CONHC ₆ H ₅	213.09	135			
4486	C ₁₃ H ₁₁ NO ₂	<i>p</i> -Aminosalol	229.09	152			
4487	C ₁₃ H ₁₁ NO ₄	Gallanilide	245.09	205			
4488	C ₁₃ H ₁₁ N ₃	2, 8-Diaminoacridine	209.11	284			
4489	C ₁₃ H ₁₁ O ₆	Gelsemic acid	247.09	206			
4490	C ₁₃ H ₁₂	Diphenylmethane (C ₆ H ₅) ₂ CH ₂	168.09	27	262	1.006	1030
4491	C ₁₃ H ₁₂	<i>o</i> -Phenyltoluene CH ₃ C ₆ H ₄ C ₆ H ₅	168.09		260		
4492	C ₁₃ H ₁₂	<i>m</i> -Phenyltoluene CH ₃ C ₆ H ₄ C ₆ H ₅	168.09		277	1.031 ⁶	
4493	C ₁₃ H ₁₂	<i>p</i> -Phenyltoluene CH ₃ C ₆ H ₄ C ₆ H ₅	168.09	-3	267	1.015 ²⁷	
4494	C ₁₃ H ₁₂ N ₂	Benzaldehyde phenylhydrazine	196.11	156			
4495	C ₁₃ H ₁₂ N ₂ O	1-Benzoyl-1-phenylhydrazine	212.11	70			
4496	C ₁₃ H ₁₂ N ₂ O	1-Benzoyl-2-phenylhydrazine	212.11	168			
4497	C ₁₃ H ₁₂ N ₂ O	<i>o</i> , <i>o'</i> -Diaminobenzophenone	212.11	135			
4498	C ₁₃ H ₁₂ N ₂ O	<i>m</i> , <i>m'</i> -Diaminobenzophenone	212.11	174			
4499	C ₁₃ H ₁₂ N ₂ O	<i>p</i> , <i>p'</i> -Diaminobenzophenone	212.11	237			
4500	C ₁₃ H ₁₂ N ₂ O	1, 2-Diphenylurea CO(NHC ₆ H ₅) ₂	212.11	235	260		1329
4501	C ₁₃ H ₁₂ N ₂ O	1, 1-Diphenylurea (C ₆ H ₅) ₂ NCONH ₂	212.11	189			
4502	C ₁₃ H ₁₂ N ₂ O	Harmine	212.11	257 d.			
4503	C ₁₃ H ₁₂ N ₂ O ₄	<i>o</i> -Nitrobenzylaniline	228.11	44; 57			
4504	C ₁₃ H ₁₂ N ₂ S	1, 2-Diphenylthiourea	228.17	154	d.	1.321 ⁴	
4505	C ₁₃ H ₁₂ O	<i>o</i> -Benzylphenol C ₆ H ₅ CH ₂ C ₆ H ₄ OH	184.09	21	312		
4506	C ₁₃ H ₁₂ O	<i>p</i> -Benzylphenol C ₆ H ₅ CH ₂ C ₆ H ₄ OH	184.09	84	322		
4507	C ₁₃ H ₁₂ O	Diphenyl carbinol (C ₆ H ₅) ₂ CHOH	184.09	68	298.5		
4508	C ₁₃ H ₁₂ O	Benzyl phenyl ether C ₆ H ₅ OCH ₂ C ₆ H ₅	184.09	39	287		
4509	C ₁₃ H ₁₂ O ₂ S	Phenyl- <i>p</i> -toluenesulfonate	248.16	96			
4512	C ₁₃ H ₁₂ N	Benzylaniline C ₆ H ₅ NHCH ₂ C ₆ H ₅	183.11	37	300	1.038 ²⁸	
4513	C ₁₃ H ₁₂ N	<i>N</i> -Methyldiphenylamine (C ₆ H ₅) ₂ NCH ₃	183.11	-7.6	293.4	1.047 ²⁸	
4514	C ₁₃ H ₁₃ NO	<i>m</i> -(<i>o</i> -Tolylamino) phenol	199.11	91	375		
4515	C ₁₃ H ₁₃ NO	<i>p</i> -(<i>m</i> -Tolylamino) phenol	199.11	91	350		
4517	C ₁₃ H ₁₃ NO ₂ S	Toluene- <i>p</i> -sulfonamide	247.17	103			
4518	C ₁₃ H ₁₄ N ₂	Diphenylguanidine	211.12	148			
4519	C ₁₃ H ₁₄ N ₂	<i>o</i> , <i>p'</i> -Diaminodiphenylmethane	198.12	88			
4520	C ₁₃ H ₁₄ N ₂	<i>m</i> , <i>m'</i> -Diaminodiphenylmethane	198.12	48			
4521	C ₁₃ H ₁₄ N ₂	<i>m</i> , <i>p'</i> -Diaminodiphenylmethane	198.12	90			
4522	C ₁₃ H ₁₄ N ₂	<i>p</i> , <i>p'</i> -Diaminodiphenylmethane	198.12	89			
4523	C ₁₃ H ₁₄ N ₂	1-Phenyl-2-benzylhydrazine	198.12	26			
4524	C ₁₃ H ₁₄ N ₂ O	Harmaline	214.12	238			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4525	$C_{11}H_{14}N_2O_4$	Analgen (5-Acetyl-amino-8-ethoxyquinoline)	230.12	155			
4526	$C_{11}H_{14}N_2S$	1, 2-Di(<i>p</i> -aminophenyl) thiourea	258.21	195			
4526 1	$C_{13}H_{18}O_2$	Isobutyl phenylpropionate	202.11		176 ¹²	1.158 ²¹	
4527	$C_{13}H_{18}O_4$	Drinone	234.11	256			
4528	$C_{13}H_{16}Cl_2N_2O_4$	Chloralantipyrine	353.51	68			
4529	$C_{13}H_{18}N$	2, 5, 6, 8-Tetramethylquinoline	185.12	20	300		
4530	$C_{13}H_{18}N$	2, 4-Dimethylquinoline ethiodide	313.06	225			
4530 1	$C_{13}H_{16}N_2O$	4-Ethyl antipyrine	216.14	68			1237
4530 2	$C_{13}H_{16}N_2O$	1-Phenyl-2-propyl-3-methylpyrazolone	216.14	93			1262
4530 3	$C_{13}H_{16}O$	Benzalpinacoline	188.12	39.5		0.939 ⁶⁰	1048
4531	$C_{13}H_{18}O_4$	Ethyl benzylacetacetate	220.12		290 d.	1.036 ¹⁴	
4532	$C_{13}H_{18}O_4$	Isoeugenol propionate	220.12		292		
4533	$C_{13}H_{18}O_4$	Ethyl phenylmalonate	236.12		285 d.	1.095 ²⁴	
4534	$C_{13}H_{18}O_7$	<i>l</i> -Helein	284.12	175			
4535	$C_{13}H_{18}O_7$	Salmigrin	284.12	195			
4536	$C_{13}H_{17}NO_4$	Thermodin	251.14	88			1333
4537	$C_{13}H_{17}N_3O$	Pyramadon	231.16	108			
4538	$C_{13}H_{15}BrNO_2$	Phenoval	300.06	150			
4539	$C_{13}H_{15}N_2O$	Eseroline	218.10	127			
4541	$C_{13}H_{15}N_4O_8S$	Hexamethylenetetramine sacchylsulfonic acid (Hexal)	358.24	100 d.			
4542	$C_{13}H_{18}O$	Phenyl hexyl ketone $C_6H_5COC_6H_{13}$	190.14	17	271.5		
4543	$C_{13}H_{18}O_2$	Eugenol propyl ether	206.14		270.5	1.002	
4544	$C_{13}H_{18}O_4$	Phenyl heptylate $C_6H_5CO_2C_6H_{13}$	206.14		282.3	0.982 ¹⁸	
4545	$C_{13}H_{18}O_4$	Isonmyl anisate	222.14		188 ³⁰	1.040	638
4546	$C_{13}H_{18}O_7$	Methylarbutin	286.14	175			
4547	$C_{13}H_{18}O_7$	Salicin	286.14	201.5	240	1.434 ²⁴	
4548	$C_{13}H_{18}O_8$	Calmatambetin	302.14	148			
4549	$C_{13}H_{18}NO$	Heptanilide $CH_3(CH_2)_5CONHC_6H_5$	205.15	71			
4550	$C_{13}H_{16}NO_2$	Benzalaminoacetal	221.15		220 ¹⁰⁰		
4551	$C_{13}H_{16}NO_2$	Dioseorine	221.15	43.5			
4552	$C_{13}H_{16}NO_2$	Pollotine	237.15	111			1333
4553	$C_{13}H_{16}NO_2$	Gynocardine	333.15	162			
4554	$C_{13}H_{16}O_4$	Aucubine	303.15	181			
4555	$C_{13}H_{16}ClNO_2$	Dioseorine hydrochloride	257.62	204			
4556	$C_{13}H_{20}ClNO_2$	Gujasanol (Diethylaminoacetic acid guaiacol hydrochloride)	273.62	184			
4557	$C_{13}H_{16}N_2O_2$	Novocaine	236.17	60			
4558	$C_{13}H_{16}N_2O_2(2H_2O)$	Novocaine	272.19	51			
4559	$C_{13}H_{16}O$	α -Ionone	192.15		147.5 ²⁸	0.930	988
4560	$C_{13}H_{16}O$	β -Ionone	192.15		140 ¹⁸	0.944	667, 951
4561	$C_{13}H_{16}O$	Irone	192.15		144 ¹⁶	0.930	605
4562	$C_{13}H_{16}O$	Lactucol	192.15	160			
4563	$C_{13}H_{16}O$	Pseudoionone	192.15		170 ²⁸	0.897	1001
4564	$C_{13}H_{16}O_2$	Galbanic acid	208.15	156			
4565	$C_{13}H_{17}ClN_2O_4$	Novocaine hydrochloride	272.64	156			
4566	$C_{13}H_{17}ClN_2O_4$	Procaine	272.64	155			
4567	$C_{13}H_{17}N$	<i>N</i> -Ethyl-isoamylaniline	191.17		262		
4568	$C_{13}H_{17}NO_4$	Meteloidine	255.17	141			
4569	$C_{13}H_{17}BrNO_4$	Meteloidine hydrobromide	336.09	250			
4570	$C_{13}H_{17}N_2O_2$	Ethylheptylbarbituric acid	254.19	119			
4571	$C_{13}H_{18}O$	Zeorin	194.17	251			
4572	$C_{13}H_{18}O_2$	<i>d</i> -Bornyl propionate	210.27		110 ¹¹	0.979 ¹⁵	857
4573	$C_{13}H_{18}O_2$	<i>l</i> -Menthyl pyruvate	226.17		140 ²²	0.985	
4574	$C_{13}H_{18}O_7$	Taxicatin	290.17	171			
4575	$C_{13}H_{18}NO_2$	Cuscohygrine	226.19		170 ²²		
4576	$C_{13}H_{18}O$	Allyl <i>l</i> -menthyl ether	196.19		104 ¹⁹	0.876	
4577	$C_{13}H_{18}O$	Geranylacetone	196.19		139 ¹⁹		
4578	$C_{13}H_{18}O_2$	<i>l</i> -Menthyl propionate	212.19		118 ¹⁸	0.918	
4579	$C_{13}H_{18}O_2$	<i>l</i> -Menthyl <i>dl</i> -lactate	228.19	32	142 ¹⁸	0.984	
4580	$C_{13}H_{18}O_4$	Brassylic acid	244.19	114			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4580.1	C ₁₃ H ₁₈ O ₄	Di-4-amyI malonate	244 19		154 ¹³	0.962 ²⁸	
4581	C ₁₃ H ₁₈	Tridecylene	182 20		232 7	0.845 ⁹	
4582	C ₁₃ H ₁₈ O ₂	Tridecyl acid CH ₃ (CH ₂) ₁₁ CO ₂ H	214 20	51	230 ¹⁰⁰		
4583	C ₁₃ H ₁₈ O ₂	IsoamyI caprylate.....	214 20		136 ¹⁰		
4584	C ₁₃ H ₁₈ O ₂	Methyl laurate C ₁₁ H ₂₂ CO ₂ CH ₃	214 20	5	148 ¹⁶		
4585	C ₁₃ H ₁₈	Dipropylhexylmethane (C ₃ H ₇) ₂ CHC ₆ H ₁₃	181 22		221 2	0.765 ^{4, 4}	299
4586	C ₁₃ H ₁₈	Tributylmethane (C ₄ H ₉) ₃ CH	184 22			0.760	300
4587	C ₁₃ H ₁₈	n-Tridecane CH ₃ (CH ₂) ₁₁ CH ₃	184 22	- 6 2	234	0.757	908
4588	C ₁₃ H ₁₈ O	Di-n-hexylcarbinol (C ₆ H ₁₃) ₂ CHOH	200 22	42			
4589	C ₁₃ H ₁₈ O	n-Tridecyl alcohol CH ₃ (CH ₂) ₁₁ CH ₂ OH	200 22	30 5	150 ¹³	0.822 ¹¹	
4590	C ₁₃ H ₁₈ N	Tridecylamine CH ₃ (CH ₂) ₁₁ CH ₂ NH ₂	199 23	27	265		
4591	C ₁₃ H ₈ Cl ₈	Octachloroanthracene	453 68	>350			
4592	C ₁₃ H ₈ Cl ₇	Heptachloroanthracene	419 23	>350			
4593	C ₁₃ H ₈ Cl ₆ O ₂	1, 2, 3, 4-Tetrachloroanthraquinone.	345 86	191			
4594	C ₁₃ H ₈ Cl ₆ O ₂	β-Tetrachloroanthraquinone	345 86	330			
4595	C ₁₃ H ₈ Cl ₆	Hexachloroanthracene	384 78	330			
4596	C ₁₃ H ₈ Cl ₅ O ₂	α-1, 2-Dichloroanthraquinone	276 96	161			
4597	C ₁₃ H ₈ Cl ₅ O ₂	β-1, 2-Dichloroanthraquinone	276 96	207			
4598	C ₁₃ H ₈ Cl ₅ O ₂	1, 4-Dichloroanthraquinone	276 96	187 5			
4599	C ₁₃ H ₈ Cl ₅ O ₂	1, 5-Dichloroanthraquinone	276 96	232			
4600	C ₁₃ H ₈ Cl ₅ O ₂	1, 6-Dichloroanthraquinone	276 96	204			
4601	C ₁₃ H ₈ Cl ₅ O ₂	1, 8-Dichloroanthraquinone	276 96	199			
4602	C ₁₃ H ₈ Cl ₅ O ₂	2, 3-Dichloroanthraquinone	276 96	267			
4603	C ₁₃ H ₈ Cl ₅ O ₂	2, 6-Dichloroanthraquinone	276 96	282			
4604	C ₁₃ H ₈ Cl ₅ O ₂	2, 7-Dichloroanthraquinone	276 96	211			
4605	C ₁₃ H ₈ Cl ₄	1, 2, 3, 4-Tetrachloroanthracene	315 88	149			
4606	C ₁₃ H ₈ Cl ₄	α-Tetrachloroanthracene....	315 88	220			
4607	C ₁₃ H ₈ Cl ₄	β-Tetrachloroanthracene.....	315 88	152			
4608	C ₁₃ H ₈ N ₂ O ₄	1, 3-Dinitroanthraquinone	298 06	240			
4609	C ₁₃ H ₈ O ₄	Ellagic acid	302 05			1.667 ¹⁰	
4610	C ₁₃ H ₇ ClO ₂	1-Chloroanthraquinone ..	242 51	162			
4611	C ₁₃ H ₇ ClO ₂	2-Chloroanthraquinone ..	242 51	208			
4612	C ₁₃ H ₇ ClO ₂	3-Chloroanthraquinone ..	242 51	204			
4613	C ₁₃ H ₇ NO ₄	1-Nitroanthraquinone ..	253 06	230			
4614	C ₁₃ H ₇ NO ₄	2-Nitroanthraquinone ..	253 06	181			
4615	C ₁₃ H ₇ NO ₆	4-Nitro-α-alizarin ..	285 06	280			
4616	C ₁₃ H ₇ NO ₆	3-Nitro-β-alizarin ..	285 06	244			
4617	C ₁₃ H ₈ Br ₂	9, 10-Dibromoanthracene	335 80	221			
4618	C ₁₃ H ₈ Cl ₂	1, 2-Dichloroanthracene.	246 98	255			
4619	C ₁₃ H ₈ Cl ₂	9, 10-Dichloroanthracene	246 98	209			
4620	C ₁₃ H ₈ O ₂	Anthraquinone C ₆ H ₄ :(CO) ₂ C ₆ H ₄	208 06	285	379.8	1.438	
4621	C ₁₃ H ₈ O ₂	Isoanthraquinone ..	208 06	212			
4622	C ₁₃ H ₈ O ₂	Phenanthraquinone ..	208 06	207	360	1.405	
4623	C ₁₃ H ₈ O ₂	3, 4-Phenanthraquinone ..	208 06	133			
4624	C ₁₃ H ₈ O ₂	2-Hydroxyanthraquinone	224 06	302			
4625	C ₁₃ H ₈ O ₂	Diphenic anhydride ..	224 06	219			
4626	C ₁₃ H ₈ O ₄	Alizarin	240 06	290	430		
4627	C ₁₃ H ₈ O ₄	Anthraflavic acid ..	240 06	330			
4628	C ₁₃ H ₈ O ₄	Anthrarufin.....	240 06	280			
4629	C ₁₃ H ₈ O ₄	1, 6-Dihydroxyanthraquinone	240 06	272			
4630	C ₁₃ H ₈ O ₄	1, 7-Dihydroxyanthraquinone	240 06	292			
4631	C ₁₃ H ₈ O ₄	Chrysazin... ..	240 06	191			
4632	C ₁₃ H ₈ O ₄	Hystazarin (2, 3-Dihydroxyanthraqui- none).....	240 06	>280			
4633	C ₁₃ H ₈ O ₄	Quinizarin ..	240 06	195			
4634	C ₁₃ H ₈ O ₄	Xanthopurpurin ..	240 06	263			
4635	C ₁₃ H ₈ O ₄	Anthragallol ..	256 06	310	s. 290		
4636	C ₁₃ H ₈ O ₄	Anthrapurpurin ..	256 06	330	462		
4637	C ₁₃ H ₈ O ₄	Flavopurpurin ..	256 06	>360	459		
4638	C ₁₃ H ₈ O ₄	Purpurin... ..	256 06	256			
4639	C ₁₃ H ₈ O ₄	1, 4, 6-Trihydroxyanthraquinone	256 06	>300			
4640	C ₁₃ H ₈ Cl	1-Chloroanthracene ..	212 53	82		1.171 ^{10, 6}	1140
4641	C ₁₃ H ₈ Cl	9-Chloroanthracene.....	212 53	103			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4642	$C_{14}H_9NO_2$	1-Aminoanthraquinone	223.08	256			
4643	$C_{14}H_9NO_2$	2-Aminoanthraquinone	223.08	302			
4644	$C_{14}H_9NO_2$	9-Nitroanthracene	223.08	146			
4645	$C_{14}H_9NO_2$	2-Nitrophenanthrene	223.08	99			
4646	$C_{14}H_9NO_2$	3-Nitrophenanthrene	223.08	170			
4647	$C_{14}H_9NO_2$	4-Nitrophenanthrene	223.08	80			
4648	$C_{14}H_9NO_2$	9-Nitrophenanthrene	223.08	116			
4649	$C_{14}H_{10}$	Anthracene $C_6H_4:(CH)_2:C_6H_4$	178.08	218	342	1.25 ²⁷	
4650	$C_{14}H_{10}$	Diphenylacetylene $C_6H_5CC(C_6H_5)_2$	178.08	60	300		
4651	$C_{14}H_{10}$	Isoanthracene	178.08	134.5			
4652	$C_{14}H_{10}$	Phenanthrene	178.08	99.6	340.2	1.025	1158
4653	$C_{14}H_8Cl_2$	Dichlorostilbene	248.99	170			
4654	$C_{14}H_8Cl_2$	α -Tolane dichloride	248.99	143	183 ¹³		
4655	$C_{14}H_8Cl_2$	β -Tolane dichloride	248.99	63	178 ¹⁸		
4656	$C_{14}H_8Cl_4$	Tolane tetrachloride	319.91	163			
4656.1	$C_{14}H_{10}N_2O_2$	Phthalylphenylhydrazine	238.09	179		1.356	
4657	$C_{14}H_{10}N_2O_2$	α -Diaminoanthraquinone	238.09	236			
4658	$C_{14}H_{10}N_2O_2$	β -Diaminoanthraquinone	238.09	>300			
4659	$C_{14}H_{10}N_2O_2$	p, p' -Azoxybenzaldehyde	254.09	194			
4660	$C_{14}H_{10}N_2O_4$	o, o' -Azobenzene acid	270.09	237			
4661	$C_{14}H_{10}N_2O_4$	m, m' -Azobenzene acid	270.09	340			
4662	$C_{14}H_{10}N_2O_4$	$\alpha-p, p'$ -Dinitrostilbene	270.09	285			
4663	$C_{14}H_{10}N_2O_4$	$\beta-p, p'$ -Dinitrostilbene	270.09	216			
4664	$C_{14}H_{10}N_2O_4$	o, o' -Azoxybenzoic acid	286.09	240			
4665	$C_{14}H_{10}N_2O_4$	m, m' -Azoxybenzoic acid	286.09	320			
4666	$C_{14}H_{10}N_2O_4$	p, p' -Azoxybenzoic acid	286.09	240 d.			
4667	$C_{14}H_{10}O$	Anthranol	194.08	170 d.			
4668	$C_{14}H_{10}O$	1-Anthrol (1-Hydroxyanthracene)	194.08	153			
4669	$C_{14}H_{10}O$	2-Anthrol	194.08	200 d.			
4670	$C_{14}H_{10}O$	Diphenylketene $(C_6H_5)_2C=CO$	194.08		146 ¹²	1.104	
4671	$C_{14}H_{10}O$	Phenanthrone	194.08	152			
4672	$C_{14}H_{10}O_2$	Benzil $C_6H_5COCOC_6H_5$	210.08	95.2	348	1.521 ^{1, 2}	1186
4673	$C_{14}H_{10}O_2$	Chrysazol	210.08	220 d.			
4674	$C_{14}H_{10}O_2$	Flavene	210.08	270			
4675	$C_{14}H_{10}O_2$	3, 4-Dihydroxyphenanthrene	210.08	143			
4676	$C_{14}H_{10}O_2$	Benzoic anhydride $(C_6H_5CO)_2O$	226.08	43	360	1.199 ¹⁴	
4677	$C_{14}H_{10}O_2$	o -Benzoylbenzoic acid	226.08	127			
4678	$C_{14}H_{10}O_2$	m -Benzoylbenzoic acid	226.08	162			
4679	$C_{14}H_{10}O_2$	p -Benzoylbenzoic acid	226.08	194			
4680	$C_{14}H_{10}O_2$	Desoxyvalizarin	226.08	208			
4681	$C_{14}H_{10}O_2$	Disalicylic aldehyde	226.08	128			
4682	$C_{14}H_{10}O_4$	Benzoylsalicylic acid	242.08	207			
4683	$C_{14}H_{10}O_4$	1, 8-Diphenic acid	242.08	252			
4684	$C_{14}H_{10}O_4$	1, 9-Diphenic acid	242.08	216			
4685	$C_{14}H_{10}O_4$	1, 10-Diphenic acid	242.08	228			
4686	$C_{14}H_{10}O_4$	2, 9-Diphenic acid	242.08	340			
4687	$C_{14}H_{10}O_4$	Diphenyl oxalate $(CO_2C_6H_5)_2$	242.08	136 d.	325 s. d.		
4688	$C_{14}H_{10}O_4$	Benzoyl peroxide $(C_6H_5CO_2)_2$	242.08	104	d.		1235
4689	$C_{14}H_{10}O_6S_4$	Dithiosalicylic acid	306.21	290			
4690	$C_{14}H_{10}O_6$	Gentianin	258.08	267	400		
4691	$C_{14}H_{10}O_6$	Gentienin	258.08	225			
4692	$C_{14}H_{10}O_6$	Salicylsalicylic acid	258.08	148			
4693	$C_{14}H_{10}O_6$	Aponeic acid	274.08	252 d.			
4694	$C_{14}H_{10}O_6$	Tannin	322.08	200 d.			
4695	$C_{14}H_{11}N$	α -Anthramine $C_6H_4:(CH)_2:C_6H_5NH_2$	193.09	130			
4696	$C_{14}H_{11}N$	β -Anthramine $C_6H_4:(CH)_2:C_6H_5NH_2$	193.09	238			
4697	$C_{14}H_{11}N$	o -Benzylbenzotrile	193.09	19	314		
4698	$C_{14}H_{11}N$	1-Methylacridine	193.09	88			
4699	$C_{14}H_{11}N$	3-Methylacridine	193.09	134			
4700	$C_{14}H_{11}N$	5-Methylacridine	193.09	114	360 ⁷⁴⁰		
4701	$C_{14}H_{11}N$	α -Naphthoquinakdine	193.09	>300			
4702	$C_{14}H_{11}N$	β -Naphthoquinakdine	193.09	82	>300		
4703	$C_{14}H_{11}N$	γ -Naphthoquinakdine	193.09	92			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4704	C ₁₄ H ₁₁ NO ₂	α -Benziloxime C ₆ H ₅ COC(:NOH)C ₆ H ₅	225.09	138			
4705	C ₁₄ H ₁₁ NO ₄	Dibenzohydroxamic acid	241.09	161			
4706	C ₁₄ H ₁₁ NO ₄	Disalicylamide	257.09	200 d.			
4707	C ₁₄ H ₁₃	1, 1-Diphenylethylene (C ₆ H ₅) ₂ C=CH ₂	180.09	9	277	1.038 ₄ ¹⁴	837
4708	C ₁₄ H ₁₃	Stilbene C ₆ H ₅ CH=CHC ₆ H ₅	180.09	124	307	0.970 ₁₁ ¹⁵	
4709	C ₁₄ H ₁₃ N ₃	Benzalazine C ₆ H ₅ CH=N.NCHC ₆ H ₅	208.11	93			
4710	C ₁₄ H ₁₃ N ₃	Orexine	208.11	95		1.290 ⁶	
4711	C ₁₄ H ₁₃ N ₃	Tolazone	208.11	187	>360		
4712	C ₁₄ H ₁₃ N ₃ O ₂	α -Benzildioxime (C ₆ H ₅) ₂ C=NOH ₂	240.11		237 d.		
4713	C ₁₄ H ₁₃ N ₃ O ₂	β -Benzildioxime	240.11	105			
4714	C ₁₄ H ₁₃ N ₃ O ₂	γ -Benzildioxime	240.11	165			
4715	C ₁₄ H ₁₃ N ₃ O ₂	Oxanilide (CONHC ₆ H ₅) ₂	240.11	250	320		
4716	C ₁₄ H ₁₃ N ₃ O ₄	Di- <i>o</i> -aminophenyl oxalate	272.11	167.5 d.			
4717	C ₁₄ H ₁₃ N ₃ O ₄	Di- <i>m</i> -aminophenyl oxalate	272.11	180 d.			
4718	C ₁₄ H ₁₃ N ₃ O ₄	Di- <i>p</i> -aminophenyl oxalate	272.11	220 d.			
4719	C ₁₄ H ₁₃ N ₃ O ₄	Hydrazo- <i>o</i> -benzoic acid	272.11	205			
1722	C ₁₄ H ₁₃ N ₃ S	Dehydrothio- <i>p</i> -toluidine	240.17	191	434		
4723	C ₁₄ H ₁₃ O	Diphenylacetaldehyde	196.09		193 ²⁷	1.100	775
4724	C ₁₄ H ₁₃ O	Phenyl benzyl ketone	196.09	60	322		
4725	C ₁₄ H ₁₃ O	Phenyl <i>o</i> -tolyl ketone	196.09	> -18	316		
1726	C ₁₄ H ₁₃ O	Phenyl <i>m</i> -tolyl ketone	196.09		316.5	1.088 ₁₇ ⁸	
4727	C ₁₄ H ₁₃ O	Phenyl <i>p</i> -tolyl ketone	196.09	60	326.5		1188
4728	C ₁₄ H ₁₃ O ₂	Benzoin C ₆ H ₅ COCH(OH)C ₆ H ₅	212.09	133	344		
4729	C ₁₄ H ₁₃ O ₂	<i>o</i> -Benzylbenzoic acid	212.09	114			
4730	C ₁₄ H ₁₃ O ₂	<i>m</i> -Benzylbenzoic acid	212.09	108			
4731	C ₁₄ H ₁₃ O ₂	<i>p</i> -Benzylbenzoic acid	212.09	155			
4732	C ₁₄ H ₁₃ O ₂	Diphenylacetic acid (C ₆ H ₅) ₂ CHCO ₂ H	212.09	148			
4733	C ₁₄ H ₁₃ O ₂	Benzyl benzoate C ₆ H ₅ CO ₂ CH ₂ C ₆ H ₅	212.09	18.5	324	1.114 ₁₈ ⁸	
4734	C ₁₄ H ₁₃ O ₂	<i>p</i> -Cresyl benzoate <i>p</i> -CH ₃ C ₆ H ₄ CO ₂ CC ₆ H ₅	212.09	71.5	316		
4735	C ₁₄ H ₁₃ O ₂	Benzyl salicylate	228.09		214 ²² ⁸		
4736	C ₁₄ H ₁₃ O ₂	<i>m</i> -Cresyl benzoate C ₆ H ₅ CO ₂ C ₆ H ₄ CH ₃	212.09	55			
4737	C ₁₄ H ₁₃ O ₂	Trihydroxydihydroanthracene	228.09	256			
4738	C ₁₄ H ₁₃ O ₃	Benzic acid (C ₆ H ₅) ₂ C(OH)CO ₂ H	228.09	150			
4739	C ₁₄ H ₁₃ O ₃	Amyrolin	228.09	124		1.351 ¹⁸	1312
4740	C ₁₄ H ₁₃ O ₃	Benzosol C ₆ H ₅ CO ₂ C ₆ H ₄ (OCH ₃) ₂	228.09	61			
4741	C ₁₄ H ₁₃ O ₃	<i>o</i> -Cresyl salicylate	228.09	35			
4742	C ₁₄ H ₁₃ O ₃	<i>m</i> -Cresyl salicylate	228.09	74			
4743	C ₁₄ H ₁₃ O ₃	<i>p</i> -Cresyl salicylate	227.09	39			
4744	C ₁₄ H ₁₃ O ₄	Cotoin	224.09	129			
4745	C ₁₄ H ₁₃ O ₄	Isocotoin	244.09	162			
4746	C ₁₄ H ₁₃ O ₄	Guaiacetyl salicylate	244.09	65			
4747	C ₁₄ H ₁₃ O ₆	Gardenin	276.09	164			
4748	C ₁₄ H ₁₃ NO	<i>N</i> -Benzoyl- <i>o</i> -toluidine	211.11	143			1296
4749	C ₁₄ H ₁₃ NO	<i>N</i> -Benzoyl- <i>m</i> -toluidine	211.11	125			1299
4750	C ₁₄ H ₁₃ NO	<i>N</i> -Benzoyl- <i>p</i> -toluidine	211.11	158	232		1291
4751	C ₁₄ H ₁₃ NO	<i>o</i> -Benzylbenzamide	211.11	163			
4752	C ₁₄ H ₁₃ NO	<i>N</i> -Diphenylacetamide	211.11	103			
4753	C ₁₄ H ₁₃ NO	Phenylacetanilide	211.11	117			1281
4754	C ₁₄ H ₁₃ NO ₂	Benzoylanisidine	227.11	154			
4755	C ₁₄ H ₁₃ N ₃ O	<i>m</i> -Acetylaminobenzene	239.12	131			
4756	C ₁₄ H ₁₄	Dibenzyl (C ₆ H ₅ CH ₂) ₂	182.11	52.5	284	0.942 ₆ ¹⁰	1118
4757	C ₁₄ H ₁₄	1, 1-Diphenylethane (C ₆ H ₅) ₂ CHCH ₃	182.11		272	1.006 ₁₁ ¹¹	763
4758	C ₁₄ H ₁₄	<i>o</i> , <i>o'</i> -Ditolyl (CH ₃ C ₆ H ₄) ₂	182.11	17.8	272	0.955 ¹⁰	
4759	C ₁₄ H ₁₄	<i>o</i> , <i>m'</i> -Ditolyl (CH ₃ C ₆ H ₄) ₂	182.11		287.5		
4760	C ₁₄ H ₁₄	<i>o</i> , <i>p'</i> -Ditolyl (CH ₃ C ₆ H ₄) ₂	182.11		281		
4761	C ₁₄ H ₁₄	<i>m</i> , <i>m'</i> -Ditolyl (CH ₃ C ₆ H ₄) ₂	182.11	7	288	0.999	
4762	C ₁₄ H ₁₄	<i>p</i> , <i>p'</i> -Ditolyl (CH ₃ C ₆ H ₄) ₂	182.11	121	295		
4763	C ₁₄ H ₁₄ N ₂	<i>o</i> , <i>o'</i> -Azotoluene (<i>o</i> -CH ₃ C ₆ H ₄ N) ₂	210.12	55			
4764	C ₁₄ H ₁₄ N ₂	<i>o'</i> , <i>p'</i> -Azotoluene	210.12	71			
4765	C ₁₄ H ₁₄ N ₂	<i>m</i> , <i>m'</i> -Azotoluene (<i>m</i> -CH ₃ C ₆ H ₄) ₂ N ₂	210.12	55			
4766	C ₁₄ H ₁₄ N ₂	<i>p</i> , <i>p'</i> -Azotoluene (<i>p</i> -CH ₃ C ₆ H ₄) ₂ N ₂	210.12	144			
4767	C ₁₄ H ₁₄ N ₂	<i>o</i> , <i>o'</i> -Diaminostilbene	210.12	170			
4768	C ₁₄ H ₁₄ N ₂	<i>p</i> , <i>p'</i> -Diaminostilbene	210.12	231			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4769	$C_{10}H_{14}N_2O$	Agathin <i>o</i> -OHC ₆ H ₄ CH=N.N(CH ₃)C ₆ H ₅	226.12	74			
4770	$C_{10}H_{14}N_2O$	<i>o</i> , <i>o</i> '-Azoxytoluene	226.12	59			
4771	$C_{10}H_{14}N_2O$	<i>m</i> , <i>m</i> '-Azoxytoluene	226.12	37			
4772	$C_{10}H_{14}N_2O$	<i>p</i> , <i>p</i> '-Azoxytoluene	226.12	70			
4773	$C_{10}H_{14}N_2O_2$	<i>o</i> , <i>o</i> '-Azoanisole (<i>o</i> -CH ₃ OC ₆ H ₄) ₂ N ₂	242.12	164.0			
4774	$C_{10}H_{14}N_2O_2$	<i>p</i> , <i>p</i> '-Azoxyanisole (<i>p</i> -CH ₃ OC ₆ H ₄) ₂ N ₂	258.12	117.4			
4775	$C_{10}H_{14}N_4$	"Cyanaline"	238.14	220			
4776	$C_{10}H_{14}N_4O_4$	Theobromine salicylate	318.14				
4777	$C_{10}H_{14}O$	Benzyl ether (C ₆ H ₅ CH ₂) ₂ O	198.11		298	1.036 ¹⁶	1333
4778	$C_{10}H_{14}O$	<i>o</i> -Cresyl ether (CH ₃ C ₆ H ₄) ₂ O	198.11		278	1.047 ¹⁴	
4779	$C_{10}H_{14}O$	<i>m</i> -Cresyl ether (CH ₃ C ₆ H ₄) ₂ O	198.11		288		
4780	$C_{10}H_{14}O$	<i>p</i> -Cresyl ether (<i>p</i> -CH ₃ C ₆ H ₄) ₂ O	198.11	50			
4781	$C_{10}H_{14}O_2$	<i>dl</i> -Hydrobenzoin [C ₆ H ₅ CH(OH)] ₂	214.11	139	> 300		
4782	$C_{10}H_{14}O_2$	Guaiacyl benzyl ether	214.11	62			
4783	$C_{10}H_{14}O_2$	Isolhydrobenzoin	214.11	121			
4784	$C_{10}H_{14}O_2S$	Dibenzylsulfone (C ₆ H ₅ CH ₂) ₂ SO ₂	246.17	150	290 s. d.		
4785	$C_{10}H_{14}O_2S$	<i>p</i> -Ditolylsulfone (CH ₃ C ₆ H ₄) ₂ SO ₂	246.17	158	405 ¹⁴		
4786	$C_{10}H_{14}S_2$	Dibenzyl disulfide (C ₆ H ₅ CH ₂) ₂ S ₂	246.24	72			
4787	$C_{10}H_{14}S$	Dibenzylsulfide (C ₆ H ₅ CH ₂) ₂ S	214.17	49		1.071 ¹⁰	
4788	$C_{10}H_{14}Se$	Dibenzyl selenide (C ₆ H ₅ CH ₂) ₂ Se	261.31	45.5			
4789	$C_{10}H_{14}N$	Dibenzylamine (C ₆ H ₅ CH ₂) ₂ NH	197.12	-26.0	300	1.026 ²¹	976
4790	$C_{10}H_{14}N$	<i>o</i> -Ditolylamine (<i>o</i> -CH ₃ C ₆ H ₄) ₂ NH	197.12		313.4		
4791	$C_{10}H_{14}N$	<i>m</i> -Ditolylamine (<i>m</i> -CH ₃ C ₆ H ₄) ₂ NH	197.12		320		
4792	$C_{10}H_{14}N$	<i>p</i> -Ditolylamine (<i>p</i> -CH ₃ C ₆ H ₄) ₂ NH	197.12	79	330.5		
4793	$C_{10}H_{14}N$	Ethylidiphenylamine (C ₆ H ₅) ₂ NC ₂ H ₅	197.12		297		
4794	$C_{10}H_{14}N$	<i>N</i> -Methylbenzylaniline	197.12	9.2	306		
4795	$C_{10}H_{14}NO_2S$	<i>p</i> -Toluenesulfonemethylanilide	261.19	95			
4796	$C_{10}H_{14}N_2$	1-Amino-2, 4'-dimethylazobenzene	225.14	127			
4797	$C_{10}H_{14}N_2$	4'-Amino-2, 3'-dimethylazobenzene	225.14	100			
4798	$C_{10}H_{14}N_2$	1-Amino-2, 3'-dimethylazobenzene	225.14	80			
4799	$C_{10}H_{14}N_2$	4-Amino-3, 4'-dimethylazobenzene	225.14	127			
4800	$C_{10}H_{14}N_2$	<i>o</i> , <i>o</i> '-Diazoaminotoluene	225.14	51			
4801	$C_{10}H_{14}N_2$	<i>p</i> , <i>p</i> '-Diazoaminotoluene	225.14	116			
4802	$C_{14}H_{16}$	Hexahydroanthracene	184.12	63	290		
4803	$C_{10}H_{14}N_2$	<i>o</i> -Hydrazotoluene (<i>o</i> -CH ₃ C ₆ H ₄ NH) ₂	212.14	165			
4805	$C_{10}H_{14}N_2$	<i>p</i> -Hydrazotoluene (CH ₃ C ₆ H ₄ NH) ₂	212.14	126	d.	0.957	
4806	$C_{10}H_{14}N_2$	<i>o</i> -Tolidine [4, 3-H ₂ N(CH ₃)C ₆ H ₄] ₂	212.14	129			
4807	$C_{10}H_{14}N_2$	<i>m</i> -Tolidine [4, 2-H ₂ N(CH ₃)C ₆ H ₄] ₂	212.14	107			
4808	$C_{10}H_{14}N_2O$	3-Ethoxybenzidine	228.14	139			
4809	$C_{10}H_{14}N_2O_2$	3, 3'-Dimethoxybenzidine	244.14	172			
4810	$C_{10}H_{14}N_4$	2, 2'-Diamino-4, 4'-azotoluene	240.16	203			
4811	$C_{10}H_{14}N_4$	3, 3'-Diamino-2, 2'-azotoluene	240.16	a, 145; b, 133; c, 159			
4812	$C_{10}H_{14}N_4O_9$	Oscine pierate	384.16	238			
4813	$C_{14}H_{17}N$	Diethyl- α -naphthylamine	199.14		160.6 ¹⁸	1.005	937
4814	$C_{14}H_{17}N$	Diethyl- β -naphthylamine	199.14		192 ¹⁹	1.026	977
4815	$C_{14}H_{17}NO$	Etheserolene	215.14	48			
4816	$C_{14}H_{17}NO_4$	Indican	295.14	57			
4817	$C_{14}H_{17}NO_4$	<i>l</i> -Mandelonitrile glucoside	295.14	147			
4818	$C_{14}H_{17}NO_6$	Prulaurasin	295.14	122			
4819	$C_{14}H_{17}NO_6$	Sambunigrin	295.14	152			
4820	$C_{14}H_{19}O_2$	Apocynamarin	234.14	175 d.			
4821	$C_{14}H_{19}O_7$	Picein	298.14	194			
4822	$C_{14}H_{16}N_2O_6S$	Methylamino- <i>p</i> -phenol sulfate	344.24	260 d.			
4823	$C_{14}H_{16}O_2$	Isonic acid	220.15	41			
4823.1	$C_{14}H_{16}O_2$	<i>l</i> -Amyl hydrocinnamate	220.15		172 ²⁰	0.9721	
4824	$C_{14}H_{16}O_2$	Helleboretin	236.15	> 200			
4825	$C_{14}H_{14}ClN_2O_4$	Nirvanin	316.64	185			
4826	$C_{14}H_{17}NO_2$	Thymacetone	235.17	136			
4827	$C_{14}H_{18}$	1, 2, 3, 4-Tetraethylbenzene	190.17		254	0.887	637
4828	$C_{14}H_{18}$	1, 2, 4, 5-Tetraethylbenzene	190.17	13	250	0.888	609
4829	$C_{14}H_{17}ClNO_2$	Stovain	271.64	175			
4830	$C_{14}H_{18}O_2$	Longifolic acid	222.17	153	234 ²⁴		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4831	C ₁₁ H ₂₀ O ₄	Dicyclohexyl oxalate	254 17	45	191 ¹³		
4831.1	C ₁₁ H ₂₀ ClO ₄	Di- <i>l</i> -amyl chlorofumarate	290 65		185 ¹²	1 052 ²⁸	
4832	C ₁₁ H ₂₀ N	<i>N</i> -Dibutylaniline C ₆ H ₅ N(C ₄ H ₉) ₂	205 19		262 8		
4832.1	C ₁₁ H ₂₀ N	Diisobutylaniline	205 19		146 ²¹	0 909 ¹⁶	
4833	C ₁₁ H ₁₈ O ₂	Kersyl alcohol.	224 19	85	156 ¹¹		
4834	C ₁₁ H ₂₀ O ₂	<i>d</i> -Bornyl <i>n</i> -butyrate.	224 19		121 ¹¹	0 906 ¹⁵	856
4835	C ₁₁ H ₂₀ O ₂	Geranyl butyrate	224 19		153 ¹⁸	0 901	
4836	C ₁₁ H ₂₀ O ₂	<i>l</i> -Menthyl crotonate	224 19		140 5 ¹⁴	0 833	
4837	C ₁₁ H ₂₀ O ₂	<i>l</i> -Menthyl acetoneacetate	240 19	45	145 ¹¹	0 986 ¹⁵	
4837.1	C ₁₁ H ₂₀ O ₄	Di- <i>l</i> -amyl maleate	256 19		165 ²⁸	0 9708 ²⁸	
4838	C ₁₁ H ₂₀ O ₄	<i>l</i> -Menthyl acid succinate	256 19	62	300 d.		
4839	C ₁₁ H ₂₁ NO ₂	Carpaine.	239 20	121			1333
4840	C ₁₁ H ₂₀ ClNO ₂	Carpaine hydrochloride	275 67	225			
4841	C ₁₁ H ₂₀ O ₂	<i>l</i> -Menthyl <i>n</i> -butyrate	226 20		129 ¹⁵	0 911	
4842	C ₁₁ H ₂₀ O ₂	<i>l</i> -Menthyl isobutyrate	226 20		117 ¹²	0 900	
4843	C ₁₁ H ₂₀ O ₂	<i>n</i> -Heptylic anhydride (C ₇ H ₁₅ CO) ₂ O	242 20	17	258	0 932	332
4844	C ₁₁ H ₂₀ O ₂	Menthyl ethyl glycolate	212 20		155 ²⁰		
4845	C ₁₁ H ₂₀ O ₄	Diethyl succinate	258 20		293	0 952 ¹⁵	
4845.1	C ₁₁ H ₂₀ O ₄	Di- <i>l</i> -amyl succinate	258 20		129 ¹⁵	0 957 ²⁸	
4846	C ₁₁ H ₂₀ O ₄	Diethyl sebacate.	258 20	1	308	0 965 ¹⁶	
4846.1	C ₁₁ H ₂₀ O ₄	Diisoamyl tartrate	290 20		195 ¹⁶	1 063 ¹⁶	
4847	C ₁₁ H ₂₇ ClO	Myristyl chloride CH ₃ (CH ₂) ₁₀ COCl	246 67	-1	168 ¹⁶		
4848	C ₁₁ H ₂₇ N	Myristic nitrile CH ₃ (CH ₂) ₁₀ CN	209 22	19	226 ¹⁰⁰	0 828	
4849	C ₁₁ H ₂₂	<i>n</i> -Tetradecylene	196 22	-12	246	0 775	
4850	C ₁₁ H ₂₀ O	Myristic aldehyde CH ₃ (CH ₂) ₁₀ CHO	212 22	52 5	160 ²⁴		
4851	C ₁₁ H ₂₀ O ₂	Myristic acid CH ₃ (CH ₂) ₁₀ CO ₂ H	228 22	58	250 5 ¹⁰⁰	0 858 ⁴⁰	1088
4852	C ₁₁ H ₂₀ O ₂	Ethyl laurate C ₁₁ H ₂₂ CO ₂ C ₂ H ₅	228 22	-10 7	269	0 868 ¹⁵	337
4853	C ₁₁ H ₂₀ O ₂	Hydroxymyristic acid.	244 22	51			
4854	C ₁₁ H ₂₀ O ₄	Ipurolic acid	260 22	101			
4855	C ₁₁ H ₂₀ NO	Myristic amide CH ₃ (CH ₂) ₁₀ CONH ₂	227 23	103			
4856	C ₁₁ H ₂₀	<i>n</i> -Tetradecane CH ₃ (CH ₂) ₁₀ CH ₃	198 23	5.5	252 5	0 765	412
4857	C ₁₁ H ₂₀ O	<i>n</i> -Heptyl ether (C ₇ H ₁₅) ₂ O	214 23		260	0 815 ⁹	
4858	C ₁₁ H ₂₀ O	<i>n</i> -Tetradecyl alcohol C ₁₁ H ₂₇ CH ₂ OH	214 23	38	167 ¹⁵	0 824 ¹⁵	
4859	C ₁₁ H ₂₁ N	Tetradecyl amine C ₁₁ H ₂₃ CH ₂ NH ₂	213 25	37	162 ¹⁵		
4860	C ₁₁ H ₈ O ₄	Anthraquinone- α -carboxylic acid	252 06	294			
4861	C ₁₁ H ₈ O ₄	Anthraquinone- β -carboxylic acid	252 06	288			
4862	C ₁₁ H ₈ O ₄	Anthraquinone- γ -carboxylic acid	252 06	285			
4863	C ₁₁ H ₈ O ₄	Alizarin- β -carboxylic acid	284 06	305			
4864	C ₁₁ H ₈ O ₇	Pseudopurpurin.	300 06	220			
4865	C ₁₁ H ₉ N	Thebenidine.	203 08	148			
4866	C ₁₁ H ₁₀	Fluoranthene.	190 08	110	251 ⁶⁰		
4867	C ₁₁ H ₁₀	Succisterene	190 08	160	300		
4868	C ₁₁ H ₁₀ O ₂	Flavone	222 08	97			
4869	C ₁₁ H ₁₀ O ₂	Anthracene-1-carboxylic acid	222 08	260			
4870	C ₁₁ H ₁₀ O ₂	Anthracene-2-carboxylic acid	222 08	280			
4871	C ₁₁ H ₁₀ O ₂	Anthracene-9-carboxylic acid	222 08	206			
4872	C ₁₁ H ₁₀ O ₂	1-Methylanthraquinone	222 08	171			
4873	C ₁₁ H ₁₀ O ₂	2-Methylanthraquinone	222 08	175			
4874	C ₁₁ H ₁₀ O ₂	Chrysine.	254 08	275			
4875	C ₁₁ H ₁₀ O ₄	Chrysophanic acid	254 08	193			
4876	C ₁₁ H ₁₀ O ₄	α -Methylalizarin	254 08	229			
4877	C ₁₁ H ₁₀ O ₄	β -Methylalizarin	254 08	179			
4878	C ₁₁ H ₁₀ O ₄	Rumicin	254 08	182			
4879	C ₁₁ H ₁₀ O ₄	Aloe-emodin.	270 08	218			
4880	C ₁₁ H ₁₀ O ₄	Emodin.	270 08	250			
4881	C ₁₁ H ₁₀ O ₄	Galangin.	270 08	217			
4882	C ₁₁ H ₁₀ O ₄	Morindon	270 08	275			
4883	C ₁₁ H ₁₀ O ₆	Fisetin.	286 08	360			
4884	C ₁₁ H ₁₀ O ₆	Kaempferol	286 08	274			
4885	C ₁₁ H ₁₀ O ₆	Luteolin.	286 08	320			
4886	C ₁₁ H ₁₀ O ₆	Rhein	286 08	314			
4887	C ₁₁ H ₁₀ O ₆	Scutellarein.	286 08	300 d.			
4888	C ₁₁ H ₁₀ O ₇	Morin.	302 08	285			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No
4889	C ₂₁ H ₁₆ O ₇	Quercetin.....	302.08	310			
4890	C ₂₁ H ₁₆ O ₈	Gossypetin	318.08	230			
4891	C ₂₁ H ₁₆ O ₈	Quercetagetin	318.08	318			
4892	C ₁₆ H ₁₁ N	2-Phenylquinoline	205.09	86	363		
4893	C ₁₆ H ₁₁ N	4-Phenylquinoline	205.09	62			
4894	C ₁₆ H ₁₁ N	6-Phenylquinoline	205.09	111	260 ⁷⁷	1.195	
4895	C ₁₆ H ₁₁ N	8-Phenylquinoline	205.09		283 ¹⁸⁷		
4896	C ₁₆ H ₁₁ NO	Benzoylphenylacetoneitrile	221.09	99			
4897	C ₁₆ H ₁₃	α -Methylanthracene	192.09	86	200	1.047 ^{99, 4}	1134
4898	C ₁₆ H ₁₃	2-Methylanthracene	192.09	207			
4899	C ₁₆ H ₁₃	9-Methylanthracene	192.09	80		1.066 ^{99, 4}	1136
4900	C ₁₀ H ₁₂ N ₂ O ₃	Furfuramide	268.11	121	250 d.		
4901	C ₁₀ H ₁₂ N ₂ O ₃	Furfurine	268.11	116			
4902	C ₁₆ H ₁₂ O	Benzylidenacetophenone	208.09	62	348	1.071 ⁴²	
4903	C ₁₆ H ₁₂ O ₂	Benzylacetophenone	224.09	81	>200		
4904	C ₁₆ H ₁₂ O ₃	<i>p</i> -Tolnyl- <i>o</i> -benzoic acid ..	240.09	139			
4905	C ₁₆ H ₁₂ O ₄	Chrysophanol	240.09	204			
4906	C ₁₆ H ₁₂ O ₄	Acetylalol <i>o</i> -CH ₃ CO ₂ C ₆ H ₄ CO ₂ C ₆ H ₅	256.09	97	198		
4907	C ₁₆ H ₁₂ O ₄	Benzosulin	256.09	85	385		
4908	C ₁₆ H ₁₂ O ₄	Diphenyl malonate (CH ₂ (CO ₂ C ₆ H ₅) ₂)	256.09	50	210 ¹³ d.		
4909	C ₁₆ H ₁₂ O ₄	Erodietol	288.09	267			
4910	C ₁₆ H ₁₂ O ₆	Methylenedisalicylic acid	288.09	238 d.			
4911	C ₁₆ H ₁₃ NO ₄	Salophen	271.11	188			
4912	C ₁₆ H ₁₄ O	Benzylacetophenone..	210.11	73	360		
4913	C ₁₆ H ₁₄ O	Benzyl <i>p</i> -tolyl ketone	210.11	109	360		
4914	C ₁₆ H ₁₄ O	Dibenzyl ketone (C ₆ H ₅ CH ₂) ₂ CO	210.11	33.9	330.5		
4915	C ₁₆ H ₁₄ O	<i>p</i> , <i>p'</i> -Dimethylbenzophenone	210.11	92	335.1		
4916	C ₁₆ H ₁₄ O ₂	Benzyl <i>o</i> -toluate	226.11		315	1.12 ¹⁷	
4917	C ₁₆ H ₁₄ O ₂	Benzyl phenylacetate	226.11		319	1.101	
4918	C ₁₆ H ₁₄ O ₄	Benzyl mandelate	242.11	93			
4919	C ₁₆ H ₁₄ O ₄	Methyl benzilate	242.11	73			
4920	C ₁₆ H ₁₄ O ₄	Lapachol	242.11	140			
4921	C ₁₆ H ₁₄ O ₄	Hydrocotoin	258.11	95.5			
4922	C ₁₆ H ₁₄ O ₄	Peucedanin	258.11	109			
4923	C ₁₆ H ₁₄ O ₄	<i>N</i> -Xanthoxyllin	258.11	132.5			
4924	C ₁₆ H ₁₄ O ₄	Gumivyl carbonate (<i>o</i> -CH ₃ OC ₆ H ₄ O) ₂ CO	274.11	86			
4925	C ₁₆ H ₁₄ O ₄	Kavaun (Methystem)	274.11	137			
4926	C ₁₆ H ₁₄ O ₄	Phloretin	274.11	255 d.			1333
4927	C ₁₆ H ₁₄ NO	<i>p</i> -Dimethylaminobenzophenone	225.12	90			
4928	C ₁₆ H ₁₄ NO ₃	Malakin	257.12	92			
4929	C ₁₆ H ₁₄ NO ₃	Narcocine acid	337.12	184			
4930	C ₁₆ H ₁₆	Dibenzylmethane (C ₆ H ₅ CH ₂) ₂ CH ₂	190.12	<-20	299	1.007	762
4931	C ₁₆ H ₁₆ N ₂ O	<i>sym</i> .-Di- <i>o</i> -tolylurea ..	240.14	256			
4932	C ₁₆ H ₁₆ N ₂ O	<i>sym</i> .-Di- <i>m</i> -tolylurea	240.14	203			
4933	C ₁₆ H ₁₆ N ₂ O	<i>sym</i> .-Di- <i>p</i> -tolylurea	240.14	263			
4934	C ₁₆ H ₁₆ N ₂ S	1, 2-Di- <i>o</i> -tolylthiourea	256.20	156	218		
4935	C ₁₆ H ₁₆ N ₂ S	<i>sym</i> .-Di- <i>m</i> -tolylthiourea	256.20	111.5			
4936	C ₁₆ H ₁₆ O ₂	Santonic acid	228.12	132.5			
4936.1	C ₁₆ H ₁₆ O ₄	Picrotoxin	292.12	206			1265
4937	C ₁₆ H ₁₆ O ₆	Daphnin	340.12	200			
4938	C ₁₆ H ₁₆ O ₆	Esculin	340.12	205			
4939	C ₁₆ H ₁₇ N	Ethylbenzylaniline	211.14		298	1.034 ^{18, 4}	
4940	C ₁₆ H ₁₇ N ₃	Di- <i>o</i> -tolylguanidine	239.16	179			
4941	C ₁₆ H ₁₈	Azulene	198.14		168.4 ¹¹	0.988	
4942	C ₁₆ H ₁₈ N ₂	<i>p</i> , <i>p'</i> -Diamino- <i>o</i> , <i>o'</i> -ditolylmethane	226.16	149			
4943	C ₁₆ H ₁₈ O ₃	Santonin	246.14	170		1.187	1282
4944	C ₁₆ H ₁₈ O ₄	Artemisin	262.14	202			1333
4944.1	C ₁₆ H ₁₈ O ₄	Coriamyrtin	262.14	225			
4945	C ₁₆ H ₁₈ O ₇	Hyenanchin.	310.14	234 d.			
4946	C ₁₆ H ₁₈ O ₇	Picrotin	310.14	250			
4947	C ₁₆ H ₁₈ NO ₄	Tropacocaine	245.15	49	d.	1.043 ¹⁰⁰	1147
4948	C ₁₆ H ₁₈ NO ₄	Lithuric acid	357.15	204.5			
4949	C ₁₆ H ₁₈ ClNO ₄	Tropacocaine hydrochloride.....	281.62	271			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4950	C ₁₅ H ₂₀ O ₂	Alantolactone	232 15	76	192 ¹⁰		
4951	C ₁₅ H ₂₀ O ₂	Perezone	248 15	105			
4952	C ₁₅ H ₂₀ O ₂	Pipitzol	248 15	141			
4953	C ₁₅ H ₂₀ O ₂	Absinthiin	264 15	68			
4954	C ₁₅ H ₂₀ O ₂	Isosantonin acid...	264 15	155	160 ⁴		
4955	C ₁₅ H ₂₀ O ₂	dl-Santonin acid...	264 15	120 d.			
4956	C ₁₅ H ₂₀ O ₂	d(l)-Santonin acid...	264 15	179	260 ⁵	1.251	1333
4957	C ₁₅ H ₂₁ O ₂	Androsin	328 15	220			
4958	C ₁₅ H ₂₁ NO ₂	β-Eucaine	247 17	91			
4959	C ₁₅ H ₂₁ NO ₂	Ajacine	279 17	143			
4960	C ₁₅ H ₂₁ N ₃ O ₂	Physostigmine	275 19	105			1263
4961	C ₁₅ H ₂₁ N ₃ O ₂	Geneserine	291 19	129			
4962	C ₁₅ H ₂₃ BrN ₃ O ₂	Physostigmine hydrobromide	356 11				1333
4963	C ₁₅ H ₂₃ ClNO ₂	β-Eucaine hydrochloride	283 64	268			
4964	C ₁₅ H ₂₃ ClNO ₂	Ajacine hydrochloride	315 64	93			
4965	C ₁₅ H ₂₃ ClN ₃ O ₂	Physostigmine hydrochloride	311 65				1333
4966	C ₁₅ H ₂₂ O ₂	Santalal acid...	234 17		195 ⁹		
4967	C ₁₅ H ₂₂ O ₂	Eugenol isoamyl ether	234 17		302 2 d.	0.976	846
4968	C ₁₅ H ₂₂ O ₂	Thymyl isovalerate	234 17		249	0.959 ¹⁴	
4969	C ₁₅ H ₂₂ O ₂	Alantol (Alantolic) acid	250 17	94			
4970	C ₁₅ H ₂₂ Cl	Santalyl chloride	238 64		155 ¹⁰	1.040	
4971	C ₁₅ H ₂₄	Atractylene	204 19		141 ¹⁴	0.927	625
4972	C ₁₅ H ₂₄	l-Cadinene	204 19		275	0.918	631
4973	C ₁₅ H ₂₄	Cannibene	204 19		259	0.897 ¹⁵	
4974	C ₁₅ H ₂₄	α-Caryophyllene	204 19		260	0.906	596
4975	C ₁₅ H ₂₄	Cedrene...	204 19		264	0.929	590
4976	C ₁₅ H ₂₄	Clovene	204 19		263	0.930	603
4977	C ₁₅ H ₂₄	Guajene	204 19		124 ⁹	0.908	602
4978	C ₁₅ H ₂₄	Patschoulene	204 19		256	0.930	591
4979	C ₁₅ H ₂₄	α-Santalene	204 19		252	0.913 ¹⁵	862
4980	C ₁₅ H ₂₄	β-Santalene	204 19		126 ⁷	0.894	569
4981	C ₁₅ H ₂₄	γ-Santalene	204 19		120 ¹⁰	0.936	617
4982	C ₁₅ H ₂₄	α-Selinene	204 19		135 ¹⁴	0.914	
4983	C ₁₅ H ₂₄	Zingiberene...	204 19		270	0.872 ¹⁴	574
4984	C ₁₅ H ₂₄ N ₂ O	d(l)-Lupanine	248 20	44			
4985	C ₁₅ H ₂₄ N ₂ O	Oxysparteine	248 20	84	209 ¹²		
4986	C ₁₅ H ₂₄ O	Betulol	220 19		158 ¹³	0.978 ¹⁶	865
4987	C ₁₅ H ₂₄ O	α-Santalol	220 19		300	0.979 ¹⁵	957
4988	C ₁₅ H ₂₄ O	β-Santalol	220 19		309	0.973 ¹⁵	958
4989	C ₁₅ H ₂₃ BrO ₂	Bornyl bromoisovalerate	317 11		163 ¹⁰		
4990	C ₁₅ H ₂₃ NO ₇	Senecifolidine	331 20	212			
4991	C ₁₅ H ₂₆	Elemone...	206 20		119 ¹⁰	0.883	
4992	C ₁₅ H ₂₆	Ferulene	206 20		126 ⁷	0.870	
4993	C ₁₅ H ₂₆ N ₂	Isosparteine	234 22		179 ¹⁴	1.028 ¹⁷	916
4994	C ₁₅ H ₂₆ N ₂	Sparteine	234 22		325 2	1.023	959
4995	C ₁₅ H ₂₆ N ₂ O	Retamine	250 22	162			
4996	C ₁₅ H ₂₆ O	Atractylol	222 20	59	292	1.511	
4997	C ₁₅ H ₂₆ O	Cedrol...	222 20	87	294		
4998	C ₁₅ H ₂₆ O	α-Elemol...	222 20	46	143 ¹⁰	0.941 ²¹	967
4999	C ₁₅ H ₂₆ O	β-Elemol...	222 20		144 ¹⁰	0.942 ¹⁸	611
5000	C ₁₅ H ₂₆ O	Eudesmol	222 20	78	156 ¹⁰	0.988	657
5001	C ₁₅ H ₂₆ O	Farnesol	222 20		120 ⁰	0.895	548
5002	C ₁₅ H ₂₆ O	Guajol	222 20	93	289 s. d.		1175
5003	C ₁₅ H ₂₆ O	Nerolidol	222 20		277	0.880	891
5004	C ₁₅ H ₂₆ O	Zingiberol	222 20		157 ¹⁴		
5005	C ₁₅ H ₂₆ O ₂	Bornyl isovalerate	238 20		260	0.949	985
5006	C ₁₅ H ₂₆ O ₂	Isobornyl isovalerate	238 20		138 ¹²	0.957 ¹⁵	855
5007	C ₁₅ H ₂₆ O ₂	d-Bornyl n-valerate	238 20		130 ¹¹	0.956 ¹⁵	
5008	C ₁₅ H ₂₆ O ₂	l-Menthyl angelate...	238 20		141 ¹⁰		
5009	C ₁₅ H ₂₆ O ₂	l-Menthyl levulinate...	254 20		169 ¹²	0.977	
5010	C ₁₅ H ₂₆ O ₄	Tributyrin	302 20	< -75	310	1.027	361
5011	C ₁₅ H ₂₇ ClN ₂	Sparteine hydrochloride	270 68				1333
5012	C ₁₅ H ₂₇ IN ₂	Sparteine hydroiodide	362 16				1333

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5013	$C_{15}H_{22}O_2$	<i>l</i> -Menthyl isovalerate	240 22		127 ¹¹	0.907 ¹⁵	427
5014	$C_{15}H_{22}O_2$	Cinicie acid	240 22	44 2			
5015	$C_{15}H_{22}O_2$	<i>l</i> -Menthyl <i>n</i> -valerate	240 22		141 ¹⁵	0.907	
5016	$C_{15}H_{26}O_2$	Pentadecyl acid	242 23	54	257 ¹⁰⁰		
5017	$C_{15}H_{26}O_2$	Methyl myristate	242 23	19	295 3		
5018	$C_{15}H_{32}$	<i>n</i> -Pentadecane $CH_3(CH_2)_{13}CH_3$	212 25	10	270 5	0.772	
5019	$C_{15}H_{32}O$	<i>n</i> -Pentadecyl alcohol $CH_3(CH_2)_{14}OH$	228 25	40			
5020	$C_{15}H_{33}N$	Pentadecylamine	227 26	36 5	301		
5021	$C_{15}H_{33}N$	Trisoamylamine	227 26		237	0.785 ²¹	
5022	$C_{15}H_8O_6$	Anthraquinone-1, 3-dicarboxylic acid	296 06	330			
5023	$C_{15}H_8O_6$	Anthraquinone-1, 4-dicarboxylic acid	296 06	300			
5024	$C_{15}H_8O_6$	Anthraquinone-2, 3-dicarboxylic acid	296 06	340			
5025	$C_{15}H_{10}$	Diphenylacetylene	202 08	88			
5026	$C_{15}H_{10}$	Pyrene	202 08	150	>360		
5027	$C_{15}H_{10}N_2$	α , β -Naphthophenazine	230 09	142 5	>360		
5028	$C_{15}H_{10}N_2O_4$	Indigotin	262 09	392 d.		1.35	
5028 1	$C_{15}H_{10}O_2$	Diphenylmaleic anhydride	250 08	155		1.340	1211
5029	$C_{15}H_{10}O_4$	Anthracene-1, 3-dicarboxylic acid	266 08	330			
5030	$C_{15}H_{10}O_4$	Anthracene-1, 4-dicarboxylic acid	266 08	320			
5031	$C_{15}H_{10}O_4$	Anthracene-2, 3-dicarboxylic acid	266 08	345			
5032	$C_{15}H_{10}O_6$	Trifolitin	298 08	275			
5033	$C_{15}H_{11}N$	Amaron	217 09	240			
5034	$C_{15}H_{11}N$	Aminopyrene	217 09	116			
5035	$C_{15}H_{11}NO_2$	Atophan (2-Phenylquinoline-4-carboxylic acid					
			249.09	209			
5036	$C_{15}H_{11}N_3O_2$	Indigoxime	277 11	205			
5037	$C_{15}H_{12}$	α -Phenyl-naphthalene	204 09		325		
5038	$C_{15}H_{12}$	β -Phenyl-naphthalene	204 09	102.5	345		
5039	$C_{15}H_{12}$	Pseudophenanthrene	204 09	115			
5040	$C_{15}H_{13}ClNO_2$	Chloroxyl (Phenyleinchonnic acid hydrochloride)	285 56	223			
			296 11	237 5			
5041	$C_{15}H_{13}N_3O_4$	Isatid	276 12	182			
5042	$C_{15}H_{13}NO$	Azoxytolunitrile	220 09	55	340		
5043	$C_{15}H_{13}O$	Phenyl α -naphthyl ether	220 09	45; 93	335 8		
5044	$C_{15}H_{13}O$	Phenyl β -naphthyl ether	220 09	258			
5045	$C_{15}H_{13}O_2S$	Atronylonesulfone acid	284 16	258			
5046	$C_{15}H_{13}O_4$	α -Ethylalizarin	268 09	189			
5047	$C_{15}H_{13}O_4$	Pratol	268 09	253			
5048	$C_{15}H_{13}O_4$	Physcion (Physic acid)	284 09	207			
5049	$C_{15}H_{13}O_6$	Chrysocerial	300 09	>337			
5050	$C_{15}H_{13}O_6$	Emodin methyl ether	300 09	195			
5051	$C_{15}H_{13}O_6$	Hematein	300 09	250 d.			
5052	$C_{15}H_{13}O_6$	Laccanic acid	332 09		180 d.		
5053	$C_{15}H_{13}N$	Flavoline	219 11	65	375		
5054	$C_{15}H_{13}N$	<i>N</i> -Phenyl- α -naphthylamine	219 11	62	335 ²⁵⁸		
5055	$C_{15}H_{13}N$	<i>N</i> -Phenyl- β -naphthylamine	219 11	108	399 5		
5056	$C_{15}H_{13}NO_7$	Papaveric acid	331 11	233 d.			
5057	$C_{15}H_{13}N_2$	Galegine	233 12	65			
5058	$C_{15}H_{13}N_2$	Hydrazoindole	247 12	140			
5059	$C_{15}H_{14}$	Atronene	206 11		320		
5060	$C_{15}H_{14}$	2, 3-Dimethylantracene	206 11	246			
5061	$C_{15}H_{14}$	2, 4-Dimethylantracene	206 11	71			
5062	$C_{15}H_{14}$	2, 6-Dimethylantracene	206 11	231			
5062 1	$C_{15}H_{14}$	Distyrene $C_6H_5CH=CHCH=CHC_6H_5$	206 11	124			
5063	$C_{15}H_{14}$	9-Ethylantracene	206 11	59		1.041 ²²	1130
5064	$C_{15}H_{14}Cl_2N_2O_2$	3, 3'-Dichlorodiacetylbenzidine	337 04	302			
5065	$C_{15}H_{14}N_2$	α -Flavaniline	234 12	97			
5066	$C_{15}H_{14}N_2$	Indolin	234 12		245		
5066 1	$C_{15}H_{14}N_2$	1, 5-Diphenyl-3-methylpyrazole	234 12	63			1199
5067	$C_{15}H_{14}O$	Dypnone	222 11		225 ²¹		
5067 1	$C_{15}H_{14}O$	Benzylidene- <i>p</i> -tolyl ketone	222 11	77			1289
5068	$C_{15}H_{14}O_2$	Benzyl cinnamate	238 11	34	244 ¹⁵		
5069	$C_{15}H_{14}O_2$	Diphenacyl $C_6H_5COCH_2CH_2COC_6H_5$	238 11	145			

C-TABLE: C₁₅H₁₁ TO C₁₇H₁₅

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No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5070	C ₁₅ H ₁₄ O ₂	Guaiacyl cinnamate	254 11	130			
5071	C ₁₅ H ₁₄ O ₂	Phenylacetic anhydride	254 11	117 5			
5072	C ₁₅ H ₁₄ O ₂	<i>o</i> -Toluic anhydride (C ₆ H ₄ (CO) ₂ CH ₃)	254 11	39	325		
5073	C ₁₅ H ₁₄ O ₄	Dibenzyl oxalate (C ₆ H ₅ CH ₂) ₂ C ₂ O ₄	270 11	81	235 ¹⁴		
5074	C ₁₅ H ₁₄ O ₄	Diphenyl succinate (C ₆ H ₅ CH ₂) ₂ C ₄ H ₄ O ₄	270 11	121	330		
5075	C ₁₅ H ₁₄ O ₄	Brasilin	286 11	250			
5076	C ₁₅ H ₁₄ O ₄	Sakuranetin	286 11	150			
5077	C ₁₅ H ₁₄ O ₄	Diphenyl tartrate (CHOHCOC ₆ H ₅) ₂	302 11	102			
5078	C ₁₅ H ₁₄ O ₄	Hematoxylin	302 11	140			1333
5079	C ₁₅ H ₁₄ O ₄	Hesperetin	302 11	226			
5080	C ₁₅ H ₁₄ O ₄	Homoeriodictiol	302 11	223			
5081	C ₁₅ H ₁₅ NO ₂	Anisaldazine	254 12	169	180	1 031 ¹⁸⁵	
5082	C ₁₅ H ₁₅ N ₂ O ₂	Diacetylbenzidine (p-CH ₃ CONHC ₆ H ₄) ₂	268 14	331			
5082 1	C ₁₅ H ₁₅ N ₂ O ₄	<i>o</i> -Aminophenyl tartrate	332 14	211 d.			
5082 2	C ₁₅ H ₁₅ N ₂ O ₄	<i>m</i> -Aminophenyl tartrate	332 14	175 d.			
5082 3	C ₁₅ H ₁₅ N ₂ O ₄	<i>p</i> -Aminophenyl tartrate	332 14	220 d.			1293
5082 4	C ₁₅ H ₁₅ N ₂ O ₂	Diacetylhydrazobenzene	268 15	105			
5083	C ₁₅ H ₁₅ N ₂ S	Dehydrothioxyldine	268 20		197		
5084	C ₁₅ H ₁₅ N ₄ O ₁₀	Dumascenine picrate	424 16	159			
5085	C ₁₅ H ₁₆ O ₂	<i>p</i> -Dimethylbenzoin	240 12	80			
5086	C ₁₅ H ₁₆ O ₄	Anisic acid	288 12	164			
5087	C ₁₅ H ₁₆ O ₄	Ethyl benzilate	256 12	34	201 ²¹		
5088	C ₁₅ H ₁₇ NO ₂	Amygdophenone	271 14	141			
5089	C ₁₅ H ₁₇ NO ₄	Lycorine	287 14	235 d.			
5090	C ₁₅ H ₁₇ NO ₄	Phenitidine salicylate	287 14	182			
5091	C ₁₅ H ₁₈ ClNO ₄	Lycorine hydrochloride	323 61	208			
5092	C ₁₅ H ₁₈ N ₂	Azo- <i>o</i> -ethylbenzene	238 16	46 5			
5093	C ₁₅ H ₁₈ N ₂	Azo- <i>p</i> -ethylbenzene	238 16	63	>340		
5094	C ₁₅ H ₁₈ N ₂	3, 3'-Azo- <i>o</i> -xylene	238 16	111			
5095	C ₁₅ H ₁₈ N ₂	4, 4'-Azo- <i>o</i> -xylene	238 16	141			
5096	C ₁₅ H ₁₈ N ₂	4, 4'-Azo- <i>m</i> -xylene	238 16	129			
5097	C ₁₅ H ₁₈ N ₂	4, 5'-Azo- <i>m</i> -xylene	238 16	47			
5098	C ₁₅ H ₁₈ N ₂	5, 5'-Azo- <i>m</i> -xylene	238 16	137			
5099	C ₁₅ H ₁₈ N ₂	2, 2'-Azo- <i>p</i> -xylene	238 16	119			
5100	C ₁₅ H ₁₈ N ₂	Diphenylpiperazine	238 16	163 5	212 ²⁰		
5101	C ₁₅ H ₁₈ N ₂ O	Paricine	254 16	130			
5102	C ₁₅ H ₁₈ N ₂ O ₂	<i>o</i> -Azophenetol (C ₂ H ₅ OC ₆ H ₄ N) ₂	270 16	131	240		
5103	C ₁₅ H ₁₈ N ₂ O ₂	<i>p</i> -Azophenetol (C ₂ H ₅ OC ₆ H ₄ N) ₂	270 16	160 2			
5104	C ₁₅ H ₁₈ N ₂ O ₂	3, 3'-Azoxy-4-methoxytoluene	286 16	140			
5105	C ₁₅ H ₁₈ N ₂ O ₂	<i>p</i> -Azoxyphenetol	286 16	136 9			
5106	(C ₁₅ H ₁₈ N ₂ O ₂) _x	Bilirubin	[286 16] _x	192 5			
5107	C ₁₅ H ₁₈ N ₂ O ₂	Carpiline	286 16	185			
5108	C ₁₅ H ₁₈ N ₂ O ₂	Hematoporphyrin	286 16	<100 d.			
5109	C ₁₅ H ₁₈ N ₂ O ₂	Pilosine	286 16	187			
5110	C ₁₅ H ₁₈ O	Thymyl phenyl ether	226 14		206 8	1 011	
5111	C ₁₅ H ₁₈ O ₂ S	Di- <i>m</i> -xylylsulfone	274 20	121			
5112	C ₁₅ H ₁₈ O ₇	Barbaloin	322 14	148			
5113	C ₁₅ H ₁₉ NO ₄	Benzoylcegonine	289 15	195			
5114	C ₁₅ H ₂₀ N ₂	3-Hydrazo- <i>o</i> -xylene	240 17	141			
5115	C ₁₅ H ₂₀ N ₂	4-Hydrazo- <i>o</i> -xylene	240 17	107			
5116	C ₁₅ H ₂₀ N ₂	4-Hydrazo- <i>m</i> -xylene	240 17	122			
5117	C ₁₅ H ₂₀ N ₂	5-Hydrazo- <i>m</i> -xylene	240 17	125			
5118	C ₁₅ H ₂₀ N ₂	2-Hydrazo- <i>p</i> -xylene	240 17	145			
5119	C ₁₅ H ₂₀ N ₂ O ₂	<i>o</i> -Hydrazophenetol (C ₂ H ₅ OC ₆ H ₄ NH) ₂	272 17	80			
5123	C ₁₅ H ₂₀ N ₄	<i>m</i> -Tetramethyldiaminoazobenzene	268 19	118			
5124	C ₁₅ H ₂₀ O ₄	Phenyl acid camphorate	276 15	100			
5125	C ₁₅ H ₂₀ O ₂	Gentiopierin	356 15	191			
5126	C ₁₅ H ₂₁ N ₂	<i>p</i> -(Tetramethyldiamino)diphenylamine...	255 19	119			
5127	C ₁₅ H ₂₁ NO ₄	Camphoranilic acid	275 17	204			
5128	C ₁₅ H ₂₁ NO ₄	Homotropine...	275 17	97 5			1333
5129	C ₁₅ H ₂₁ NO ₄	Norotropine...	275 17	114			
5130	C ₁₅ H ₂₁ NO ₄	Norhyoscyamine	275 17	140 5			
5131	C ₁₅ H ₂₂ BrNO ₂	Homotropine hydrobromide...	356 09	212 d.			1333

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5132	$C_{10}H_{13}ClNO_2$	Homotropine hydrochloride	311.64	217			1333
5133	$C_{14}H_{13}N_4$	<i>m</i> -Hydrazodimethylaniline	270.20	100			
5134	$C_{14}H_{13}N_4O_8S$	Caffeine sulfate	486.30				1333
5135	$C_{14}H_{13}O_4$	Di- <i>n</i> -butyl phthalate	278.17		340		
5135 1	$C_{14}H_{13}O_4$	Methyl santolate	278.17		86	1.167	1321
5136	$C_{14}H_{13}O_4$	Bilinic acid	310.17	190			
5137	$C_{14}H_{13}O_4$	Coniferin	342.17	185			
5138	$C_{14}H_{13}O_{11}$	<i>d</i> -Glucose pentacetate	390.17	113			
5139	$C_{14}H_{13}NO_4$	Bakunoson	357.19	157			
5140	$C_{14}H_{13}O_4$	Methyl santalate	248.19		164 ¹⁰	1.002	
5141	$C_{14}H_{13}$	Pentaethylbenzene	218.20	< -20	277	0.896	655
5142	$C_{14}H_{13}O$	Patchouli alcohol	234.20	56	271 d.	0.984 ⁷⁰	
5142 1	$C_{14}H_{13}O$	Guaol	234.20	91			1176
5143	$C_{14}H_{13}O_2$	Menthyl <i>L</i> -sorbanate	250.20		173 ¹⁴		
5143 1	$C_{14}H_{13}O_2$	Disobutyl <i>d</i> -diacetyl tartrate	346.20		157 ^{3,5}	1.0864 ¹⁷	
5144	$C_{14}H_{17}ClN_2O_2$	Alypin hydrochloride	314.68	169			
5145	$C_{14}H_{17}N_2O_4$	Alypin nitrate	341.23	152			
5146	$C_{14}H_{13}N_2$	Genistene	248.23	60 5	178 ²²		
5147	$C_{14}H_{13}O_2$	Hydrocarpic acid	252.22	60			
5148	$C_{14}H_{13}O_2$	Palmitoleic acid	252.22	47	240 ¹⁵		
5149	$C_{14}H_{13}O_4$	Palmitoxylic acid	284.22	67			
5150	$C_{14}H_{13}O_2$	Gallic acid	254.23	39			
5151	$C_{14}H_{13}O_2$	Hypogaeic acid	254.23	33	236 ¹⁵		
5152	$C_{14}H_{13}O_2$	<i>L</i> -Menthyl <i>n</i> -capronate	254.23		153 ¹⁵	0.903	
5153	$C_{14}H_{13}O_3$	<i>n</i> -Caprylic anhydride ($C_8H_{13}CO$) ₂ O	270.23	-1	285		
5154	$C_{14}H_{13}O_3$	7-Ketopalmitic acid	270.23	74			
5155	$C_{14}H_{13}N$	Palmitonitrile $CH_3(CH_2)_{13}CH_2CN$	237.25	29	251.5 ¹⁰⁰	0.822 ¹¹	
5156	$C_{14}H_{13}$	α -Hexadecene $CH_2CH(CH_2)_{13}CH_3$	224.25	4	274	0.789	388
5157	$C_{14}H_{13}N_2O_8S$	Pelletierine sulfate	380.33	133			
5158	$C_{14}H_{13}O$	Palmitic aldehyde $C_{14}H_{27}CHO$	240.25	58 5	202 ²⁹		
5159	$C_{14}H_{13}O_2$	Palmitic acid $C_{14}H_{27}CO_2H$	256.25	64	215 ¹⁵	0.853 ⁶²	1113
5160	$C_{14}H_{13}O_2$	Ethyl myristate $C_{13}H_{27}CO_2C_2H_5$	256.25	10 5	295		
5161	$C_{14}H_{13}O_2$	Jalapinoic acid	272.25	68			
5162	$C_{14}H_{13}O_2$	Jumperic acid	272.25	95			
5163	$C_{14}H_{13}O_2$	Lanopalmitic acid	272.25	88			
5164	$C_{14}H_{27}I$	<i>n</i> -Cetyl iodide $C_{14}H_{27}CH_2I$	352.19	22	212.5 ¹⁵	1.123	535
5165	$C_{14}H_{13}NO$	Palmitic amide $C_{14}H_{27}CONH_2$	255.26	106	236 ¹²		
5166	$C_{14}H_{24}$	7,8-Dimethyltetradecane	226.26	267 5		0.792 ¹⁴	
5167	$C_{14}H_{24}$	<i>n</i> -Hexadecane	226.26	20	287 5	0.775	
5168	$C_{14}H_{19}O$	Cetyl alcohol $C_{13}H_{27}CH_2OH$	242.26	49.3	344	0.798 ^{78,9}	1108
5169	$C_{14}H_{19}O$	<i>n</i> -Octyl ether $(C_8H_{17})_2O$	242.26		291 8	0.820	
5171	$C_{17}H_{13}O$	Benzanthrone	230.08	170			
5172	$C_{17}H_{13}N$	α -Anthraquinoline	229.09	170	446		
5173	$C_{17}H_{13}O$	Phenyl α -naphthyl ketone	232.09	75 5	385		
5174	$C_{17}H_{13}O$	Phenyl β -naphthyl ketone	232.09	82			
5175	$C_{17}H_{13}O_2$	Chrysene acid	248.09	186 5			
5176	$C_{17}H_{13}O_2$	α -Naphthyl benzoate	248.09	56			
5177	$C_{17}H_{13}O_2$	β -Naphthyl benzoate	248.09	110			
5178	$C_{17}H_{13}O_2$	α -Naphthyl salicylate	264.09	83			
5179	$C_{17}H_{13}O_2$	β -Naphthyl salicylate	264.09	95			
5180	$C_{17}H_{13}O_3$	Alpinin	296.09	174			
5181	$C_{17}H_{13}O_3$	Pratonsol	296.09	225			
5182	$C_{17}H_{13}NO_2$	6-Methyl-2-phenylquinoline-4-carboxylic acid	263.11	228			
5183	$C_{17}H_{14}$	α -Benzylmaphthalene	218.11	59	350	1.165 ⁹	
5184	$C_{17}H_{14}$	β -Benzylmaphthalene	218.11	35 5	350	1.176 ⁹	
5185	$C_{17}H_{14}O$	Dibenzylidenacetone	234.11	112			
5186	$C_{17}H_{14}O_2$	Atronic acid	250.11	164			
5187	$C_{17}H_{14}O_2$	Isatronic acid	250.11	157			
5188	$C_{17}H_{14}O_4$	Nepalin	282.11	136			
5189	$C_{17}H_{15}N_3O_3$	Tryptophane picrate	433.16	196 s. d.			
5190	$C_{17}H_{14}$	1, 2, 4-Trimethylanthracene	220.12	243			
5191	$C_{17}H_{14}$	1, 3, 6-Trimethylanthracene	220.12	222			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5192	C ₁₇ H ₁₄	1, 4, 6-Trimethylanthracene	220 12	227			
5193	C ₁₇ H ₁₆ O ₂	Eugenol benzoate . .	268 12	70	360		
5194	C ₁₇ H ₁₆ O ₂	Isocugenol benzoate	268 12	104			
5195	C ₁₇ H ₁₆ O ₄	Dibenzyl malonate.	284 12		234.5 ¹⁴ d.		
5196	C ₁₇ H ₁₇ NO ₂	Apomorphine.	267 14	170 d.			
5197	C ₁₇ H ₁₈ ClNO ₂	Apomorphine hydrochloride	303 61	210			1333
5198	C ₁₇ H ₁₈ N ₂ O ₄	Antipyrine resorcinate	298 16	115			
5199	C ₁₇ H ₁₈ O	Dibenzylacetone CO(CH ₂ CH ₂ C ₆ H ₅) ₂	238 14		224 ¹⁸		
5200	C ₁₇ H ₁₈ O ₂	Eugenol benzyl ether	254 14	30	235 d.		
5201	C ₁₇ H ₁₈ O ₂	Isocugenol benzyl ether	254 14	59			
5202	C ₁₇ H ₁₉ NO ₂	Morphine	285 15	d.	193 ^{vac}	1 317	1277
5203	C ₁₇ H ₁₉ NO ₂	α-Isomorphine.	285 15	247			
5204	C ₁₇ H ₁₉ NO ₂	Piperine	285 15	129 5			
5205	C ₁₇ H ₂₀ BrNO ₂	Morphine hydrobromide	366 08				1333
5206	C ₁₇ H ₂₀ ClNO ₂	Morphine hydrochloride	321 02	250 d			1343
5207	C ₁₇ H ₂₀ N ₂ O	Tetramethyldiaminobenzophenone	268 17	174	>300 s. d		
5208	C ₁₇ H ₂₀ N ₂ O ₄	Nicotine salicylate	300 17	117 5			1333
5209	C ₁₇ H ₂₀ N ₂ O ₄	l-Arabinose diphenylhydrazone	316 17	218			
5211	C ₁₇ H ₂₀ N ₂ S	3, 3-Tetramethyldiaminothiobenzophenone	284 24	202			
5212	C ₁₇ H ₂₀ N ₄ O ₂	l-Arabinosazone	340 19	166	200 d.		
5213	C ₁₇ H ₂₀ N ₄ O ₄	d-Xylosephenylosazone	328 19	164	167 d.		
5213.1	C ₁₇ H ₂₀ O ₂	Di-(p-dianisyl)dimethylmethane	256 15	60 5		1 150	1204
5214	C ₁₇ H ₂₀ O ₇	Tutin	336 15	208			
5215	C ₁₇ H ₂₀ O ₁₀	Patellarie acid	384 15	100			
5216	C ₁₇ H ₂₁ NO ₂	Apoptropine	271 17	62			
5217	C ₁₇ H ₂₁ NO ₂	Dihydromorphine	287 17	157			
5218	C ₁₇ H ₂₁ NO ₄	Atroscine	303 17	50			
5219	C ₁₇ H ₂₁ NO ₄	α-Cocaine.	303 17	88			
5220	C ₁₇ H ₂₁ NO ₄	dl-Cocaine	303 17	80			
5221	C ₁₇ H ₂₁ NO ₄	d(l)-Cocaine	303 17	98			1326
5222	C ₁₇ H ₂₁ NO ₄	Hyosine	303 17	55			1333
5223	C ₁₇ H ₂₁ NO ₄	dl-Pseudococaine	303 17	81 5		1 103 ^{99.5}	1130
5224	C ₁₇ H ₂₁ NO ₄	d-Pseudococaine	303 17	41		1.102 ^{99.5}	1142
5225	C ₁₇ H ₂₁ N ₂	Auramine	267 19	136			
5226	C ₁₇ H ₂₂ BrNO ₄	Hyosine hydrobromide	384 09	194			1333
5227	C ₁₇ H ₂₂ ClNO ₂	Apoptropine hydrochloride	307 64	230			1333
5228	C ₁₇ H ₂₂ ClNO ₄	Cocaine hydrochloride	339 64	187			1257
5229	C ₁₇ H ₂₂ ClNO ₄	Hyosine hydrochloride	339 64				1333
5230	C ₁₇ H ₂₂ N ₂	p-(Tetramethyldiamino)-diphenylmethane.	254 19	91			
5231	C ₁₇ H ₂₂ N ₂ O	p-(Tetramethyldiamino)-diphenyl carbinol [p-(CH ₃) ₂ NC ₆ H ₄] ₂ CHOH	270 19	96			
5232	C ₁₇ H ₂₂ O ₂	Podocarpic acid.	274 17	188			
5233	C ₁₇ H ₂₂ O ₄	Guaiacyl acid camphorate	306 17	112			
5234	C ₁₇ H ₂₂ O ₅	Syringin.	370 17	192			
5235	C ₁₇ H ₂₂ NO ₂	Atropine.	289 19	115.5			1333
5236	C ₁₇ H ₂₂ NO ₂	d-Hyoscyamine.	289 19	106			
5237	C ₁₇ H ₂₂ NO ₄	Pseudoatropine	289 19	120			
5238	C ₁₇ H ₂₂ BrNO ₄	Atropine hydrobromide	370 11	162			1333
5239	C ₁₇ H ₂₂ BrNO ₄	Hyoscyamine hydrobromide	370 11	152			1333
5240	C ₁₇ H ₂₂ ClNO ₄	Atropine hydrochloride	325 65	165			1333
5241	C ₁₇ H ₂₂ ClNO ₄	Hyoscyamine hydrochloride	325 65				1333
5242	C ₁₇ H ₂₂ N ₂ O ₄ S	Sinapine thiocyanate	368 27	176			
5243	C ₁₇ H ₂₂ N ₂ O ₄	Atropine nitrate	352 20				1333
5244	C ₁₇ H ₂₂ O ₂	Menthyl benzoate	260 19	54 5	288	0 808	
5244.1	C ₁₇ H ₂₂ O ₄	Ethyl santoate	292 19	89		1.148	1322
5245	C ₁₇ H ₂₂ O ₁₀	Verbenalin.	388 19	181.6			
5246	C ₁₇ H ₂₃ NO ₂	Eupphthalmine.	291 20	113			
5247	C ₁₇ H ₂₃ O ₄	Scillitin.	325 19	154			
5248	C ₁₇ H ₂₃ ClNO ₂	Eupphthalmine hydrochloride	327.67	183			
5249	C ₁₇ H ₂₄ O	Benzylmenthol.	246.20	111	183 ¹⁰		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5250	C ₁₇ H ₃₆ O	Phetyl alcohol	248 22	100			
5251	C ₁₇ H ₃₅ NO ₂	Ajacoune	279 23	163			
5252	C ₁₇ H ₃₅ O ₂	Jakapic acid	378 23	120			
5253	C ₁₇ H ₃₅ O ₂	<i>l</i> -Menthyl heptylate	268 25		165 ¹⁵	0 901	
5254	C ₁₇ H ₃₄	8-Heptadecene C ₁₇ H ₃₄ CH ₂ CHC ₆ H ₁₃	238 26		160 ^{9, 5}	0.798 ¹⁰	
5255	C ₁₇ H ₃₄ O	Margaric aldehyde C ₁₆ H ₃₂ CHO	254 26	36	204 ²⁶		
5256	C ₁₇ H ₃₄ O ₂	Daturic acid	270 26	60	227 ¹⁰⁰		
5257	C ₁₇ H ₃₄ O ₂	Margaric acid C ₁₆ H ₃₂ CO ₂ H	270 26	59 9	227 ¹⁰⁰	0.853 ⁶⁰	
5258	C ₁₇ H ₃₅ O ₂	Methyl palmitate C ₁₆ H ₃₃ CO ₂ CH ₃	270 26	29 5	196 ¹⁶		1119
5259	C ₁₇ H ₃₅ NO ₂	Sphingosine	285 28	244	250 d.		
5260	C ₁₇ H ₃₄	<i>n</i> -Heptadecene CH ₃ (CH ₂) ₁₄ CH ₃	210 28	22 5	303	0 778	359
5261	C ₁₇ H ₃₄ O	Heptadecene-9-ol C ₁₇ H ₃₃ CH(OH)C ₆ H ₁₃	256 28	61			
5262	C ₁₇ H ₃₃ N	Heptadecylamine C ₁₇ H ₃₅ NH ₂	255 29	49	340		
5263	C ₁₈ H ₁₄	Benzanthrene	228 09	84			
5264	C ₁₈ H ₁₂	Chrysene	228 09	251	448		
5265	C ₁₈ H ₁₂	Triphenylene	228 09	198 5			
5266	C ₁₈ H ₁₂	Truxene	228 09	>360			
5267	C ₁₈ H ₁₂ N ₂	2, 3'-Diquinoyl	256 11	176			
5268	C ₁₈ H ₁₂ N ₂	2, 7'-Diquinoyl	256 11	193			
5269	C ₁₈ H ₁₂ N ₂	6, 6'-Diquinoyl	256 11	178			
5270	C ₁₈ H ₁₂ N ₂	8, 8'-Diquinoyl	256 11	205			
5271	C ₁₈ H ₁₂ O ₂	<i>o</i> -(α -Naphthoyl) benzoic acid	276 09	173 5			
5272	C ₁₈ H ₁₂ O ₂	Calyculic	308 09	240			
5273	C ₁₈ H ₁₂ N	Aminochrysene	243 11	203			
5274	C ₁₈ H ₁₄	<i>p</i> -Diphenylbenzene C ₆ H ₄ (C ₆ H ₅) ₂	230 11	205	427		
5275	C ₁₈ H ₁₄ O ₃	Cinnamic anhydride (C ₆ H ₅ CH:CHCO) ₂ O	278 11	135			
5276	C ₁₈ H ₁₄ O ₄	Epicaric	294 11	195			
5277	C ₁₈ H ₁₄ O ₇	Xanthoicidol	342 11	258			
5278	C ₁₈ H ₁₄ O ₄	Diaspium (Succinylidimalicic acid)	358 11	178			
5279	C ₁₈ H ₁₅ As	Triphenylarsine (C ₆ H ₅) ₃ As	306 08	60			
5280	C ₁₈ H ₁₅ Bi	Triphenyl bismuthine (C ₆ H ₅) ₃ Bi	410 16	78		1 585 ²⁰	
5281	C ₁₈ H ₁₅ N	Triphenylamine (C ₆ H ₅) ₃ N	245 12	126 5	365	0 774 ⁰	
5282	C ₁₈ H ₁₅ O ₃ P	Triphenyl phosphite (C ₆ H ₅ O) ₃ P	310 14		220 ¹¹	1 184 ¹⁸	
5283	C ₁₈ H ₁₅ O ₄ P	Triphenyl phosphate (C ₆ H ₅ O) ₃ PO	326 14	49 9	245 ¹¹		
5284	C ₁₈ H ₁₅ P	Triphenylphosphine (C ₆ H ₅) ₃ P	262 14	79	>360	1 194	
5285	C ₁₈ H ₁₅ Sb	Triphenylstibine (C ₆ H ₅) ₃ Sb	352 80	48	>360	1 500 ¹²	
5286	C ₁₈ H ₁₅ NO ₂	Aporhene	278 13	89	290 d.		
5287	C ₁₈ H ₁₅ N ₂	Diphenyl- <i>m</i> -phenylenediamine	260 14	95			
5288	C ₁₈ H ₁₅ N ₄	Triphenylhydrazine (C ₆ H ₅) ₃ NNHC ₆ H ₅	260 14	142		0 869 ⁷⁰	
5289	C ₁₈ H ₁₅ N ₂ O ₂	Analgin	292 14	210			
5290	C ₁₈ H ₁₅ N ₂ O ₄	5, 5'-Dibenzylbarbituric acid	308 14	222			
5291	C ₁₈ H ₁₅ N ₂ O ₅ S	Chinosol	388 20	177 5			
5292	C ₁₈ H ₁₅ O ₃	Cinnamyl cinnamate	264 12	44		1 085 ^{10, 5}	
5293	C ₁₈ H ₁₅ O ₄	α -Isotropic acid	296 12	237			
5294	C ₁₈ H ₁₅ O ₄	β -Isotropic acid	296 12	206			
5295	C ₁₈ H ₁₅ O ₄	α -Truxillic acid	296 12	272			
5296	C ₁₈ H ₁₅ O ₄	Isotruxillic acid	296 12	206			
5297	C ₁₈ H ₁₅ O ₄	γ -Truxillic acid	296 12	228			
5298	C ₁₈ H ₁₅ O ₄	δ -Truxillic acid	296 12	174			
5299	C ₁₈ H ₁₅ O ₄	ϵ -Truxillic acid	296 12	192			
5300	C ₁₈ H ₁₅ O ₄	η -Truxillic acid	296 12	260			
5301	C ₁₈ H ₁₅ O ₄	Dibenzyl fumarate	296 12	59 5	211 ⁵		
5302	C ₁₈ H ₁₅ O ₄	Nepodin	296 12	158			
5303	C ₁₈ H ₁₅ O ₇	<i>d</i> -Usnic acid	344 12	193			
5304	C ₁₈ H ₁₅ O ₇	<i>d</i> (<i>l</i>)-Usnic acid	344 12	203			1295
5305	C ₁₈ H ₁₅ O ₁₄	Igauric acid (Chlorogenic acid)	456 12	207			
5306	C ₁₈ H ₁₈	Retene	234 14	98 5	394	1 13 ¹⁴	
5307	C ₁₈ H ₁₈	1, 3, 5, 7-Tetramethylantracene	234 14	280 d.			
5308	C ₁₈ H ₁₅ N ₃ O ₄	Antipyrine salicylate	326 16	92			
5308 1	C ₁₈ H ₁₅ N ₃	Vesuvine	346 20	143 5			
5310	C ₁₈ H ₁₅ O ₄	Dibenzyl succinate	298 14	45	238 ¹⁴		
5312	C ₁₈ H ₁₅ NO ₄	Berbamune	297 15	200			
5313	C ₁₈ H ₁₅ N ₃ O ₄	Dimazon (Diacylaminoazotoluene)	309 17	75			
5314	C ₁₈ H ₁₅ BrNO ₂	Apomorphine methobromide	362.08	180			

C-TABLE: C₁₁H₂₅ TO C₁₇H₃₅

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No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5315	C ₁₁ H ₁₉ N ₃ O ₂	Cinchotennine	312.17	198			
5316	C ₁₁ H ₁₉ NO ₂	Bebeerine	299.17	214			
5317	C ₁₁ H ₁₉ NO ₂	Codene	299.17	155	179	1.315 ¹⁴	1283, 1286
5318	C ₁₁ H ₁₉ NO ₂	Isobebeerine	299.17	297			
5319	C ₁₁ H ₁₉ NO ₂	Isocodeine	299.17	144	d		1288
5320	C ₁₁ H ₁₉ NO ₂	Pseudocodeine	299.17	181		1.290 ¹⁴⁰	1204 1333
5321	C ₁₁ H ₁₉ BrNO ₂	Codene hydrobromide	380.09				
5322	C ₁₁ H ₁₉ BrNO ₂	Morphine methylbromide	380.09	265 d			
5323	C ₁₁ H ₁₉ ClNO ₂	Bebeerine hydrochloride	335.64	260			
5324	C ₁₁ H ₁₉ ClNO ₂	Codene hydrochloride	335.64	264			1333
5325	C ₁₁ H ₁₉ N ₃ O ₂	Holocaine	298.19	117			
5325.1	C ₁₁ H ₁₉ N ₃ O ₂	Pilocarpine salicylate	346.19	120			1333
5326	C ₁₁ H ₁₉ N ₃ O ₄	Galactosazone	358.20	201	202 d.		
5327	C ₁₁ H ₁₉ N ₃ O ₄	d-Glucosazone	358.20	208 d			
5328	C ₁₁ H ₁₉ N ₃ O ₄	l-Glucosazone	358.20	205 d			
5329	C ₁₁ H ₁₉ N ₃ O ₄	Gulososazone	358.20	168	180 d.		
5330	C ₁₁ H ₁₉ O ₁₀	Murrayin	398.17	170			
5331	C ₁₁ H ₁₉ ClN ₃ O ₂	Holocaine hydrochloride	334.65	189			
5332	C ₁₁ H ₁₉ NO ₂	Cocaine formate	349.19	42			
5333	C ₁₁ H ₁₉ NO ₂ P	Codene phosphate	397.22	235			1333
5334	C ₁₁ H ₁₉ O ₂	Menthyl phenylacetate	274.20		205.5 ²⁵	1.002	
5335	C ₁₁ H ₁₉ O ₂	Diamyl phthalate	306.20		344		
5336	C ₁₁ H ₁₉ NO ₂	Capsaicin	305.22	65			1226
5337	C ₁₁ H ₁₉ NO ₂	Senecioline	385.22	194			
5338	C ₁₁ H ₁₉ ClNO ₂	Senecioline hydrochloride	421.68	200			
5339	C ₁₁ H ₁₉ O ₄	Embellie acid	308.22	142			
5340	C ₁₁ H ₁₈	Hexaethylbenzene C ₆ (C ₂ H ₅) ₆	246.23	129	208	0.831 ^{120.4}	1159
5341	C ₁₁ H ₁₈ O	Sycoreryl alcohol	262.23	90			
5342	C ₁₁ H ₁₈ O ₂	Lanolenic acid	278.23		232 ¹⁷	0.914	
5343	C ₁₁ H ₁₉ ClN ₃ O ₆	d-Egonine hydrochloride	406.71	247			
5343.1	C ₁₁ H ₁₈	Fichtelite	248.25	46		1.010	1247
5344	C ₁₁ H ₁₈ O ₂	Chaulmoogric acid	280.25	69	248 ²⁰		
5345	C ₁₁ H ₁₈ O ₂	α-Eleostearic acid	280.25	49	235 ¹²		
5346	C ₁₁ H ₁₈ O ₂	Linoleic acid	280.25	< -18	230 ¹⁶	0.903	
5347	C ₁₁ H ₁₈ O ₂	Stearolic acid C ₈ H ₁₇ C(C ₂ H ₅)CO ₂ H	280.25	48	260		
5348	C ₁₁ H ₁₈ O ₂	Tariric acid	280.25	50.5			
5349	C ₁₁ H ₁₈ O ₄	Stearoxylic acid	312.25	80			
5350	C ₁₁ H ₁₈ O ₁₆	Raffinose	504.25	119	130 d.	1.465	
5351	C ₁₁ H ₁₈ O ₁₆	Procetlose	504.25	210			
5352	C ₁₁ H ₁₈ N ₃ O ₁₂	Piperazine quinate (Sidonal)	469.27	171			
5353	C ₁₁ H ₁₄	Hexadecylacetylene C ₁₀ H ₁₃ C≡CH	250.26	26	180 ¹⁵	0.798 ²²	
5354	C ₁₁ H ₁₄	1-Methyl-2-pentadecylacetylene	250.26	30	184 ¹⁵	0.802	
5355	C ₁₁ H ₁₄ O	Chaulmoogryl alcohol	266.26	36			
5356	C ₁₁ H ₁₄ O	Oleic aldehyde	266.26		160 ⁴	0.851 ¹⁵	456
5357	C ₁₁ H ₁₄ O ₂	Elaidic acid	282.26	51.5	288 ¹⁰⁶	0.851 ^{19.4}	
5358	C ₁₁ H ₁₄ O ₂	Gynocardic acid	282.26	67.5			
5359	C ₁₁ H ₁₄ O ₂	Oleic acid C ₈ H ₁₇ CH=CH(CH ₂) ₇ CO ₂ H	282.26	14	286 ¹⁰⁰	0.895 ^{17.7}	929
5360	C ₁₁ H ₁₄ O ₂	Petroselinic acid	282.26	34		0.868 ⁴⁰	1057
5361	C ₁₁ H ₁₄ O ₂	Rapic acid	282.26	14		0.897 ¹⁵	
5362	C ₁₁ H ₁₄ O ₂	l-Menthyl n-caprylate	282.26		175 ¹⁵	0.898	
5363	C ₁₁ H ₁₄ O ₂	3-Ketostearic acid	298.26	97			
5364	C ₁₁ H ₁₄ O ₂	6-Ketostearic acid	298.26	75			
5365	C ₁₁ H ₁₄ O ₂	8-Ketostearic acid	298.26	83			
5366	C ₁₁ H ₁₄ O ₂	9-Ketostearic acid	298.26	76			
5367	C ₁₁ H ₁₄ O ₂	10-Ketostearic acid	298.26	65			
5368	C ₁₁ H ₁₄ O ₂	Ricinelaic acid	298.26	53	250 ¹⁵		
5369	C ₁₁ H ₁₄ O ₂	Ricinic acid	298.26	81	252 ¹⁵		
5370	C ₁₁ H ₁₄ O ₂	Ricinoleic acid	298.26	17	250 ¹⁵	0.945 ¹⁶	
5371	C ₁₁ H ₁₄ O ₆	Oleic acid ozonide	330.26			1.022	472
5371.1	C ₁₁ H ₁₄ O ₆	Di-n-heptyl tartrate	346.26	35	235 ¹⁴	0.999 ⁴¹	
5372	C ₁₁ H ₁₄ O ₁₄	Clavisepsin	506.26	198			
5373	C ₁₁ H ₁₄ ClO	Stearyl chloride C ₁₇ H ₃₅ COCl	302.73	23	215 ¹⁵		
5374	C ₁₁ H ₁₄ N	Stearonitrile C ₁₇ H ₃₅ CN	265.28	41	214 ¹²		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5375	$C_{17}H_{33}NO$	Oleamide	281.28	76			
5376	$C_{17}H_{33}NO_2$	Oleohydroxamic acid	297.28	61			
5377	$C_{17}H_{33}$	<i>n</i> -Octadecylene	252.28	18	179 ¹⁵	0.791	
5378	$C_{17}H_{33}O$	Stearic aldehyde $C_{17}H_{33}CHO$	268.28	63.5	261 ¹⁰⁰		
5379	$C_{17}H_{33}O_2$	Stearic acid $C_{17}H_{33}CO_2H$	284.28	69.3	383	0.847 ^{49, 1}	1117
5380	$C_{17}H_{33}O_2$	Cetyl acetate $CH_3CO_2C_{16}H_{33}$	284.28	18.5	200.5 ¹⁵	0.858	1041
5381	$C_{17}H_{33}O_2$	Ethyl palmitate $C_{15}H_{31}CO_2C_2H_5$	284.28	24.2	185.5 ¹⁰		1043
5382	$C_{17}H_{33}O_2$	Methyl margarate	281.28	29			
5383	$C_{17}H_{33}O_2$	1-Hydroxystearic acid	300.28	85			
5384	$C_{17}H_{33}O_2$	<i>dl</i> -2-Hydroxystearic acid	300.28	85			
5385	$C_{17}H_{33}O_2$	9-Hydroxystearic acid	300.28	81.5			
5386	$C_{17}H_{33}O_2$	10-Hydroxystearic acid	300.28	79			
5387	$C_{17}H_{33}O_2$	11-Hydroxystearic acid	300.28	78			
5388	$C_{17}H_{33}O_4$	4, 9-Dihydroxystearic acid	316.28	136.5			
5389	$C_{17}H_{33}I$	<i>n</i> -Octadecyl iodide	380.22	34	170 ^{9, 5}		
5390	$C_{17}H_{33}NO$	Stearic amide $C_{17}H_{33}CONH_2$	283.29	109	251 ¹²		
5391	$C_{17}H_{33}$	<i>n</i> -Octadecane $CH_3(CH_2)_{16}CH_3$	254.29	28	317	0.777	1047
5392	$C_{17}H_{33}O$	<i>n</i> -Octadecyl alcohol	270.29	58.5	210.5 ¹⁶	0.812 ⁴⁹	
5394	$C_{17}H_{15}O$	Benzylidenecyclohexenone	256.09	107			
5395	$C_{17}H_{15}N$	9-Phenylacridine	255.11	181	404		
5396	$C_{17}H_{15}N_3O_8$	Tri- <i>p</i> -nitrophenylmethane	379.12	207			
5397	$C_{17}H_{15}O_2$	Aurine	290.11	> 220			
5398	$C_{17}H_{15}O_6$	Oroxylin	338.11	225			
5399	$C_{17}H_{15}$	Triphenylmethyl $(C_6H_5)_3C$	243.12	147			
5400	$C_{17}H_{15}Cl$	Triphenylchloromethane $(C_6H_5)_3CCl$	278.57	112	310		
5401	$C_{17}H_{15}N_3$	Chrysandine	285.14	270			
5402	$C_{17}H_{15}$	Triphenylmethane $(C_6H_5)_3CH$	244.12	92.5	359.2	1.014 ²⁹	1128
5403	$C_{17}H_{15}N_3$	Benzophenone phenylhydrazine	272.14	137			
5404	$C_{17}H_{15}O$	Triphenyl carbinol $(C_6H_5)_3COH$	260.12	162.5	> 360	1.188	
5405	$C_{17}H_{15}O_3$	Triphenyl orthoformate $HC(OC_6H_5)_3$	292.12	77	277 ³⁵		
5406	$C_{17}H_{15}N$	<i>m</i> -Aminotriphenylmethane	259.14	120			
5407	$C_{17}H_{15}N$	<i>p</i> -Aminotriphenylmethane	259.14	84			
5408	$C_{17}H_{15}N$	Diphenylbenzylamine	259.14	87			
5409	$C_{17}H_{15}N$	Triphenylmethylamine $(C_6H_5)_3C.NH_2$	259.14	105			
5410	$C_{17}H_{15}NO_2$	Novatophan	291.14	76			
5411	$C_{17}H_{15}NO_4$	Cusparidine	307.14	79			
5412	$C_{17}H_{15}NO_4$	Cusparine	307.14	92			
5413	$C_{17}H_{15}NO_4$	Isocusparine	307.14	194			
5414	$C_{17}H_{15}N_3$	α -Triphenylguanidine	287.16	145	d.		
5415	$C_{17}H_{15}N_3$	β -Triphenylguanidine	287.16	131			
5416	$C_{17}H_{15}ClN_3$	α -Triphenylguanidine hydrochloride	323.62	241		0.875 ¹⁰	
5417	$C_{17}H_{15}N_3$	<i>p</i> , <i>p'</i> -Diaminotriphenylmethane	274.16	140			
5418	$C_{17}H_{15}O_3$	Eugenol cinnamate	294.14	90			
5419	$C_{17}H_{15}O_7$	Eriodonol	358.14	199			
5420	$C_{17}H_{15}O_4$	Atranoric acid	374.14	197			
5421	$C_{17}H_{15}O_{11}$	Euxanthic acid	422.14	162	d.		
5422	$C_{17}H_{15}NO_4$	Ditamine	293.15	75			
5423	$C_{17}H_{15}NO_4$	Galipidine	309.15	111			
5424	$C_{17}H_{15}NO_4$	Bulbocapnine	325.15	199			1332
5425	$C_{17}H_{15}NO_4$	Stylopine	341.15	202			
5426	$C_{17}H_{15}N_3$	<i>o</i> -Leucaniline $(NH_2C_6H_4)_3CH$	289.17	165			
5427	$C_{17}H_{15}N_3$	<i>p</i> -Leucaniline $(NH_2C_6H_4)_3CH$	289.17	148			
5428	$C_{17}H_{15}N_3O$	Pararosanine $(NH_2C_6H_4)_3C(OH)$	305.17	189			
5428.1	$C_{17}H_{15}N_3O$	Cinchonine	292.17	127		1.226	1301
5429	$C_{17}H_{15}N_3O_4$	Antipyrine mandelate	340.17	53			
5430	$C_{17}H_{15}N_3O_4$	<i>dl</i> -Ornithuric acid	340.17	183			
5431	$C_{17}H_{15}O_4$	Diethyl diphenylmalonate	312.15	59			
5432	$C_{17}H_{15}O_4$	Guaiaconic acid	328.15	100			
5433	$C_{17}H_{15}NO_3$	Isothebaine	311.17	204			
5434	$C_{17}H_{15}NO_3$	Oxyacanthine	311.17	210			
5435	$C_{17}H_{15}NO_3$	Thebaine	311.17	193		1.305	
5436	$C_{17}H_{15}NO_4$	Eupyrin	343.17	88			
5437	$C_{17}H_{15}N_3$	Desoxycinchonidine	278.19	61			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5438	C ₁₅ H ₂₂ N ₂	Desoxyeinchonine.	278 19	92			
5439	C ₁₅ H ₂₂ N ₂ O	Apocinchonine	294 19	228			
5440	C ₁₅ H ₂₂ N ₂ O	Cinchonicine.	294 19	59			
5441	C ₁₅ H ₂₂ N ₂ O	Cinchonidine	294 19	210			1278
5442	C ₁₅ H ₂₂ N ₂ O	α -Cinchonine	294 19	264 3			1304
5443	C ₁₅ H ₂₂ N ₂ O	Homocinchonidine	294 19	207 6			
5444	C ₁₅ H ₂₂ N ₂ O	β -Isocinchonine	294 19	126			
5445	C ₁₅ H ₂₂ N ₂ O ₂	Apoconquinine	310 19	137			
5446	C ₁₅ H ₂₂ N ₂ O ₂	Apoquinine	310 19	210 d.			
5447	C ₁₅ H ₂₂ N ₂ O ₂	Cupreine	310 19	202			
5448	C ₁₅ H ₂₂ N ₂ O ₄	Chitenine	312 19	286 d.			
5451	C ₁₅ H ₂₂ ClN ₂ O	Cinchonidine hydrochloride	330 65	242 d.			
5452	C ₁₅ H ₂₂ ClN ₂ O	Cinchonine hydrochloride	330 65	218 d.			1333
5453	C ₁₅ H ₂₂ NO ₃	Codethyline	313 19	93			
5454	C ₁₅ H ₂₂ NO ₄	Cinnamyleocaine	329 19	121			
5455	C ₁₅ H ₂₂ NO ₄	Corytuberine	329 19	240			
5456	C ₁₅ H ₂₂ NO ₄	Porphyroxime	329 19	135			
5457	C ₁₅ H ₂₂ NO ₄	Sinomenine.	329 19	161			
5458	C ₁₅ H ₂₂ NO ₅	Morphine acetate.	345 19	200 d.			
5459	C ₁₅ H ₂₂ N ₂ O ₄	Cinchonine nitrate	357 20				1333
5460	C ₁₅ H ₂₂ BrNO ₃	Eucodine (Methylecocodeine bromide)	391 11	261			
5461	C ₁₅ H ₂₂ ClNO ₃ (2H ₂ O)	Dionine.	349 65	123	170 d.		
5462	C ₁₅ H ₂₄ N ₂ O	Cinchamidine (Hydrocinchonidine)	296 20	230			
5463	C ₁₅ H ₂₄ N ₂ O	Cinchonamine	296 20	185			
5464	C ₁₅ H ₂₄ N ₂ O	Cinchotine	296 20	280			
5465	C ₁₅ H ₂₄ N ₂ O	Pereirine	296 20	124			
5466	C ₁₅ H ₂₄ N ₂ O ₂	Conquinamine	312 20	123			
5467	C ₁₅ H ₂₄ N ₂ O ₂	Geissospermone	312 20	189			
5468	C ₁₅ H ₂₄ N ₂ O ₂	Hydrocupreine	312 20	230			
5469	C ₁₅ H ₂₄ N ₂ O ₂	Quinamine.	312 20	172			
5473	C ₁₅ H ₂₂ N ₄ O ₄	Ionidine.	373 23	156			
5474	C ₁₅ H ₂₂ N ₂ O	Aspidosine	298 22	245			
5475	C ₁₅ H ₂₂ NO ₄	α -Eucaine	333 22	103			
5476	C ₁₅ H ₂₂ ClNO ₄	α -Eucaine hydrochloride	369 68	200			
5477	C ₁₅ H ₂₈ O ₄	Abietic acid	288 22	161			1251
5478	C ₁₅ H ₂₈ O ₄	Convallaretin	320 22	>255			
5479	C ₁₅ H ₂₈ O ₁₃	Calmatambin	464 22	144			
5480	C ₁₅ H ₃₀ O ₄	Benzyl laurate C ₁₅ H ₂₇ CO ₂ CH ₂ C ₆ H ₅	290 23	8 5	211 ¹²	0 946 ²⁴	540
5481	C ₁₅ H ₃₄ O ₂	Methyl chaulmoograte	294 26	22	227 ²⁰	0 912 ²⁴	
5482	C ₁₅ H ₃₀ O ₃	Methyl ricinolate	312 28		245 ¹⁰	0 924	465
5483	C ₁₅ H ₃₀ O ₂	Nondecylic acid CH ₃ (CH ₂) ₁₂ CO ₂ H	298 29	66	209 ¹⁰⁰		
5484	C ₁₅ H ₃₈ O ₂	Ethyl margarate CH ₃ (CH ₂) ₁₅ CO ₂ C ₂ H ₅	298 29	27			
5485	C ₁₅ H ₃₈ O ₂	Methyl stearate C ₁₇ H ₃₅ CO ₂ CH ₃	298 29	38	215 ¹⁴		
5486	C ₁₅ H ₄₀	<i>n</i> -Nondecane CH ₃ (CH ₂) ₁₇ CH ₃	268 31	32	330	0 777 ²¹	1045
5487	C ₂₀ H ₁₀ I ₄ O ₄	Nosophen (Tetraiodophenolphthalein)	821 81	225			
5488	C ₂₀ H ₁₂	Perylene	252 09	264			
5489	C ₂₀ H ₁₂ O ₂	Fluoran.	300 09	175			
5490	C ₂₀ H ₁₂ O ₄	Fluorescein	332 09		280 d.		
5491	C ₂₀ H ₁₄	α , α' -Dinaphthyl C ₁₀ H ₇ .C ₁₀ H ₇	254 11	160.5	360		
5492	C ₂₀ H ₁₄	α , β' -Dinaphthyl	254 11	80			
5493	C ₂₀ H ₁₄	β , β' -Dinaphthyl C ₁₀ H ₇ .C ₁₀ H ₇	254 11	187.8	452		
5494	C ₂₀ H ₁₄	9-Phenylanthracene	254 11	153	417		
5495	C ₂₀ H ₁₄ N ₂	α , α' -Azonaphthalene.	282 12	190			
5496	C ₂₀ H ₁₄ N ₂	β , β' -Azonaphthalene	282 12	204			
5497	C ₂₀ H ₁₄ N ₂ O	α , α' -Azoxynaphthalene	298 12	127			
5498	C ₂₀ H ₁₄ N ₂ O	β , β' -Azoxynaphthalene.	298 12	167			
5499	C ₂₀ H ₁₄ O	α -Naphthyl ether (C ₁₀ H ₇) ₂ O	270 11	110	>360		
5500	C ₂₀ H ₁₄ O	β -Naphthyl ether (C ₁₀ H ₇) ₂ O	270 11	105	250 ¹⁹		
5501	C ₂₀ H ₁₄ O	α , β' -Naphthyl ether.	270 11	81	264 ¹¹		
5502	C ₂₀ H ₁₄ O ₂	α -Dinaphthol.	286 11	300			
5503	C ₂₀ H ₁₄ O ₂	β -Dinaphthol	286 11	218			
5504	C ₂₀ H ₁₄ O ₄	Phenolphthalein.	318 11	261		1.277 ²¹	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5505	$C_{10}H_{14}O_4$	Fluorescein	334.11	127			
5506	$C_{10}H_{14}O_5$	Psoromic acid	398.11	264			
5507	$C_{10}H_{14}S$	α, α' -Dinaphthyl sulfide $(C_{10}H_7)_2S$	286.17	110	200 ¹¹		
5508	$C_{10}H_{14}N$	β, β' -Dinaphthylamine $(C_{10}H_7)_2NH$	269.12	172.2	471		
5509	$C_{10}H_{16}NO_4$	Sanguinarine	333.12	213			
5510	$C_{10}H_{16}NO_5$	Berilic acid	397.12	200			
5511	$C_{10}H_{14}N_2$	<i>p</i> -Amino- α -azonaphthalene	297.14	175			
5512	$C_{10}H_{14}N_2$	Amino- β -azonaphthalene	297.14	156			
5513	$C_{10}H_{14}N_2$	α, α' -Hydrazonaphthalene	284.14	α 271; β 274			
5514	$C_{10}H_{14}N_2$	β, β' -Hydrazonaphthalene	284.14	164			
5515	$C_{10}H_{14}N_2O$	Benzalphenylhydrazine	300.14	134			
5516	$C_{10}H_{14}N_4$	Nitron	312.16	189 d.			
5517	$C_{10}H_{14}O_2$	Triphenylacetic acid $(C_6H_5)_3C.CO_2H$	288.12	265			
5518	$C_{10}H_{14}O_3$	Rosolic acid	304.12	270	d.		
5519	$C_{10}H_{17}N_3O_2$	Rubazone acid	359.17	181			
5520	$C_{10}H_{14}$	Diphenyl- <i>m</i> -tolylmethane	258.14	61.5	356	1.07 ¹⁶	
5521	$C_{10}H_{14}$	1, 1, 2-Triphenylethane	258.14	54	349.4		
5522	$C_{10}H_{14}ClNO_4$	Berberine hydrochloride	371.61			1.397	1333
5523	$C_{10}H_{14}N_2O$	α -Benzoinphenylhydrazine	302.16	155			
5524	$C_{10}H_{14}N_2O$	β -Benzoinphenylhydrazine	302.16	106			
5525	$C_{10}H_{14}N_4S$	Triphenylguanylthiourea	346.24	157			
5526	$C_{10}H_{14}N$	Dibenzylamine $C_6H_5N(CH_2C_6H_5)_2$	273.15	70			
5527	$C_{10}H_{16}NO_2$	Chelidone	353.15	136			
5528	$C_{10}H_{16}NO_2$	Papaveraldine	353.15	210			
5529	$C_{10}H_{16}NO_2$	Protopine	353.15	207			
5530	$C_{10}H_{16}NO_2$	Berberic acid	417.15	182			
5532	$C_{10}H_{16}N_2O_4$	Antipyrine acetylsalicylate	368.17	65			
5533	$C_{10}H_{16}O_2$	Cubebol	340.15	92			
5534	$C_{10}H_{16}O_4$	Cubebin	356.15	132			
5535	$C_{10}H_{16}O_7$	Coccolic acid	372.15	178			
5536	$C_{10}H_{16}O_{10}$	Scoparin	420.15	219 d.			
5537	$C_{10}H_{16}O_{13}$	Luteic acid	452.15	274			
5538	$C_{10}H_{16}NO_2$	Galipeine	323.17	115			
5539	$C_{10}H_{16}NO_4$	<i>L</i> -Canadine	339.17	134			
5540	$C_{10}H_{16}NO_4$	Dicentrine	339.17	169			
5541	$C_{10}H_{16}NO_4$	Papaverine	339.17	147	d.	1.337	1331
5542	$C_{10}H_{16}NO_4$	<i>dl</i> -Canadine	339.17	167			
5544	$C_{10}H_{16}ClNO_4$	Papaverine hydrochloride	375.64	221 d.			
5545	$C_{10}H_{16}N_2O$	Quinene	306.19	82			
5546	$C_{10}H_{16}N_2O_3$	Dehydroquinine	322.19	181			
5547	$C_{10}H_{16}N_2O_3$	Jelsemine	322.19	178			
5548	$C_{10}H_{16}N_2O_4$	Lysuric acid	354.19	145			
5549	$C_{10}H_{16}O_8$	Populin	390.17	180			
5550	$C_{10}H_{16}ClN_2O_3$	Jelsemine hydrochloride	358.65	300			
5551	$C_{10}H_{16}NO_4$	Acetylcodeine	341.19	133.5			
5552	$C_{10}H_{16}NO_4$	Corypalline	341.19	236			
5553	$C_{10}H_{16}N_2O_4$	Pyramidon salicylate	369.20	70			
5554	$C_{10}H_{16}O_4$	Naphthyl acid camphorite	327.18	122			
5555	$C_{10}H_{14}Cl_2N_2O_3$	Quinine dichloride	305.12	97			
5556	$C_{10}H_{16}NO_4$	Staphisagrine	342.19	275			
5557	$C_{10}H_{16}N_2O$	Desoxyquinine	308.20	52			
5558	$C_{10}H_{16}N_2O_3$	Isoconquinine	324.20	142			
5559	$C_{10}H_{16}N_2O_3$	Isoquinine	324.20	185			
5560	$C_{10}H_{16}N_2O_3$	Quinicine	324.20	60			
5561	$C_{10}H_{16}N_2O_3$	Quinidine	324.20	168			1298
5562	$C_{10}H_{16}N_2O_3$	Quinine	324.20	175			1279
5563	$C_{10}H_{16}N_2O_3$	Quinine (isomer A)	324.20	193.5			
5564	$C_{10}H_{16}N_2O_3$	Quinine (isomer B)	324.20	189			
5566	$C_{10}H_{16}BrN_2O_3$	Quinine hydrobromide	405.13	200			
5567	$C_{10}H_{16}ClN_2O_3$	Quinidine hydrochloride	360.67	259 d.			
5568	$C_{10}H_{16}ClN_2O_3$	Quinine hydrochloride	360.67	160	259 d.		
5570	$C_{10}H_{16}NO_3$	Lobelinine	311.20	106			
5571	$C_{10}H_{16}NO_4$	Codamine	343.20	121			

C-TABLE: C₁₀H₁₁ TO C₂₁H₃₁

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No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5572	C ₁₀ H ₁₅ NO ₄	Laudanidine	343 20	177			
5573	C ₁₀ H ₁₅ NO ₄	Laudanine	343 20	164 5		1 256	
5575	C ₁₀ H ₁₆ N ₂ O ₈ S	Quinine disulfate	422 28	160 d.			
5577	C ₁₀ H ₁₆ N ₂ O ₂	Hydroquinidine	326 22	167			
5578	C ₁₀ H ₁₆ N ₂ O ₂	Hydroquinine	326 22	172 3			
5579	C ₁₀ H ₁₇ NO ₄	Diversine	361 22	93			
5580	C ₁₀ H ₁₇ NO ₁₁	Amygdalin	457 22	200			
5581	C ₁₀ H ₁₇ N ₂ O ₄ P	Quinine hypophosphate	390 25	181			
5583	C ₁₀ H ₁₈ O ₄	Thymyl acid camphorate	332 22	89			
5584	C ₁₀ H ₁₈ O ₄	Eugenol acid camphorate	318 22	116			
5585	C ₁₀ H ₁₈ O ₄	Cholanic acid	364 22	285			
5586	C ₁₀ H ₁₈ O ₁₃	Primeverin	476 22	206			
5587	C ₁₀ H ₁₈ N ₂ O ₈	Quinine hydrate	378 25	57	d.		
5588	C ₁₀ H ₁₈ O ₂	d-Pimaric acid	302 23	212	282 ¹⁰		
5589	C ₁₀ H ₁₈ O ₄	Onoceric acid	334 23	120			
5590	C ₁₀ H ₁₈ O ₄	Andrographolide	350 23	218			
5591	C ₁₀ H ₁₈ O ₄	Andrographolic acid	368 25	188			
5592	C ₁₀ H ₁₈ NO	Myristic anilide	303 26	84			
5593	C ₁₀ H ₁₈ N ₂	Ormosine	315 28	87			
5594	C ₁₀ H ₁₈ N ₂	Ormosinine	315 28	205			
5595	C ₁₀ H ₁₈ O	Ambrosterol	290 26	147			
5596	C ₁₀ H ₁₈ O	Cinchol	290 26	139			
5597	C ₁₀ H ₁₈ O	Cupreol	290 26	140			
5598	C ₁₀ H ₁₈ O	Quebrachol	290 26	125			
5599	C ₁₀ H ₁₈ O ₁₀	Cyclamin	434 26	236			1333
5600	C ₁₀ H ₁₈ N ₂ O ₁₁	Vicine	628 34	242 d.			
5601	C ₁₀ H ₁₈ O	Exeretin	292 28	96			
5602	C ₁₀ H ₁₈ O ₂	Eicosinic acid	308 28	69	270 ¹³		
5603	C ₁₀ H ₁₈ O ₂	Ethyl chaulmoograte	308 28		230 ¹⁰	0 900	1036
5604	C ₁₀ H ₁₈ O ₂	Eicosenic acid	310 29	50	267 ¹⁸		
5605	C ₁₀ H ₁₈ O ₂	Ethyl ricinoleate	326 29		258 ¹³	0 914	481
5606	C ₁₀ H ₁₈ O	Phytol	296 31		204 ¹⁰	0 856	484
5607	C ₁₀ H ₁₈ O ₂	Arachidic acid	312 31	77	328		
5608	C ₁₀ H ₁₈ O ₂	Ethyl stearate C ₁₇ H ₃₅ CO ₂ C ₂ H ₅	312 31	33 7	224		
5609	C ₁₀ H ₁₈ I	n-Eicosyl iodide	408 25	42	192 ¹⁰		
5610	C ₁₀ H ₁₈	n-Eicosane CH ₃ (CH ₂) ₁₈ CH ₃	282 32	38	205 ¹³	0 778 ^{14,17}	1065
5611	C ₁₀ H ₁₈ O	Eicosyl alcohol CH ₃ (CH ₂) ₁₈ CH ₂ OH	298 32	71	220 ¹³		
5612	C ₂₁ H ₁₄ O	α, β'-Dinaphthyl ketone	282 11	135			
5613	C ₂₁ H ₁₄ O	β, β'-Dinaphthyl ketone	282 11	a 125 5 b 164 5			
5614	C ₂₁ H ₁₄ O ₂	Picenic acid	298 11	201			
5615	C ₂₁ H ₁₅ Bi ₂ O ₉	Bismuth salicylate	829 12	135 d.			
5616	C ₂₁ H ₁₆	α, α'-Dinaphthylmethane	268 12	109	360		
5617	C ₂₁ H ₁₆	α, β'-Dinaphthylmethane (C ₁₀ H ₇) ₂ CH ₂	268 12	95			
5618	C ₂₁ H ₁₆	β, β'-Dinaphthylmethane (C ₁₀ H ₇) ₂ CH ₂	268 12	93			
5619	C ₂₁ H ₁₆ N ₂	Lophine	296 14	275			
5620	C ₂₁ H ₁₆ O ₁₁	Methylenecitrylsalicylic acid	444 12	154			
5621	C ₂₁ H ₁₆ N ₂	Amarin	298 16	129			
5622	C ₂₁ H ₁₆ N ₂	Hydrobenzamide	298 16	101			
5623	C ₂₁ H ₁₆ O ₁₃	Scutellarin	462 14	200 d.			
5624	C ₂₁ H ₁₆ NO ₄	Fumarine	349 15	199			
5625	C ₂₁ H ₂₀	Phenylditolylmethane	272 15	56			
5626	C ₂₁ H ₂₀ N ₂ O ₄	Alstonine (Chlorogenine)	364 17	195			
5627	C ₂₁ H ₂₀ O ₄	Curcumin	368 15	183			1333
5628	C ₂₁ H ₂₀ O ₄	Aloin	416 15	147 9			
5629	C ₂₁ H ₂₀ O ₄	1, 2-Dihydro-3, 5-dihydroxy-4-(α, 3, 4-trihydroxybenzylbenzofuran)*	416 15	217			
5630	C ₂₁ H ₂₀ O ₉	Frangulin	416 15	226			
5631	C ₂₁ H ₂₀ O ₁₁	Quercitrin	448 15	185			
5632	C ₂₁ H ₂₀ O ₁₃	Incarnatin	464 15	245			
5633	C ₂₁ H ₂₁ N	Tribenzylamine (C ₆ H ₅ CH ₂) ₃ N	287 17	92		0.991 ¹⁸	
5634	C ₂₁ H ₂₁ NO ₄	d-Coreycavamine	367 17	149			
5635	C ₂₁ H ₂₁ NO ₄	Hydrastine	383 17	132			

* Also commonly known as Catechol, Pyrocatechol, Catechin, Pyrocatechin. See #1414.

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5636	$C_{11}H_{11}NO_4$	Rhoeadine	383.17	232 d.			
5637	$C_{11}H_{11}N_2$	Anhydroformaldehydeaniline	315.19	45.5	185		
5638	$C_{21}H_{21}O_4P$	Tri- <i>p</i> -cresyl phosphate	368.19	77			
5639	$C_{21}H_{21}O_4P$	Triguaiacyl phosphite	400.19	78			
5640	$C_{21}H_{21}O_4P$	Triguaiacyl phosphate	416.19	98			
5641	$C_{21}H_{21}N_7O_3$	Isostrychnine	334.19	214.5			
5642	$C_{21}H_{21}N_7O_3$	Strychnine	334.19	268	270 ^s	1.359 ¹⁸	
5645	$C_{21}H_{21}Cl_2N_3O_3$	Benzamide hydrochloride	436.12	178			
5646	$C_{21}H_{21}NO_4$	Meconidine	353.19	58			
5647	$C_{21}H_{21}NO_4$	Cryptopine	369.19	218		1.351	
5648	$C_{21}H_{21}NO_4$	Diacetylmorphine	369.19	172			1260
5649	$C_{21}H_{21}NO_4$	α -Homochelidomine	369.19	182			
5650	$C_{21}H_{21}NO_4$	β -Homochelidomine	369.19	159			
5651	$C_{21}H_{21}NO_4$	γ -Homochelidomine	369.19	171			
5652	$C_{21}H_{21}NO_4$	Colchicine	385.19	172			
5653	$C_{21}H_{21}N_7O_3$	Strychnine nitrate	397.20				1333
5654	$C_{21}H_{21}ClNO_4$	Diacetylmorphine hydrochloride	405.65	230			
5655	$C_{21}H_{21}N_7O$	Paytine	320.20	156			
5656	$C_{21}H_{21}N_7O$	Strychnidine	320.20	250.5	295 ¹⁴		
5657	$C_{21}H_{21}N_8O_{10}$	Genescrine picrate	520.23	175			
5658	$C_{21}H_{21}O_3$	Glycyphylline	420.19	180			
5659	$C_{21}H_{21}O_{10}$	Phloridzin	436.19	170 d.		1.430	
5660	$C_{21}H_{21}O_{11}$	Datisen	452.19	180			
5661	$C_{21}H_{21}O_{11}$	Saponarin	468.19	232			
5663	$C_{21}H_{21}NO_4$	Corybulbine	355.20	239			
5664	$C_{21}H_{21}NO_4$	Corydine	355.20	105			1165
5665	$C_{21}H_{21}NO_4$	Glaucine	355.20	120			
5666	$C_{21}H_{21}NO_4$	Isoecorybulbine	355.20	180			
5667	$C_{21}H_{21}N_4O_3$	Porphyrene	351.22	97			
5668	$C_{21}H_{21}N_7O$	Desoxystychnine	322.22	172			
5669	$C_{21}H_{21}N_7O_3$	Corynanthine	354.22	242			
5670	$C_{21}H_{21}N_7O_3$	Quebrachine	354.22	248			1333
5671	$C_{21}H_{21}N_7O_4$	Quinine formate	370.22	113			
5672	$C_{21}H_{21}ClN_7O_4$	Quebrachine hydrochloride	390.68	290			
5673	$C_{21}H_{21}NO_4$	<i>d</i> (<i>l</i>)-Laudanosine	357.22	89			
5674	$C_{21}H_{21}NO_{10}$	<i>d</i> -Cocaine bitartrate	453.22	112			
5675	$C_{21}H_{21}N_7O$	Tetraethylaminobenzophenone	324.23	96			
5676	$C_{21}H_{21}O_4$	Marrubium	344.22	154.5	297 ¹⁸		
5677	$C_{21}H_{21}N_7O_4$	Struxine	374.25	250 d.			
5678	$C_{21}H_{21}O_2$	Cannabinol	314.23		315 ¹⁰⁰	1.042 ¹⁸	
5679	$C_{21}H_{21}O_4$	Euonymol	346.23	250			
5680	$C_{21}H_{21}O_4$	Antiarin	410.23	215			
5681	$C_{21}H_{21}O$	Pyrethrol	302.27	199	290		
5682	$C_{21}H_{21}O_2$	Benzyl myristate $C_{13}H_{27}CO_2CH_2C_6H_5$	318.26	20.5	231 ¹¹	0.932 ¹¹	536
5683	$C_{21}H_{21}O_4$	Di- <i>d</i> -bornyl carbonate	334.26	216			
5684	$C_{21}H_{21}O_4$	Ipurganol	350.26	225			
5685	$C_{21}H_{21}O_{10}$	Helleborein	446.26	230 d.			
5686	$C_{21}H_{21}O_4$	Trifolanol	352.28	300			
5687	$C_{21}H_{21}O_3$	Di- <i>L</i> -menthyl carbonate	338.29	106			
5688	$C_{21}H_{21}O_4$	Triapron	386.29	-25		0.988	392
5689	$C_{21}H_{21}O_2$	Dimenthoformal	324.31	57	337		
5690	$C_{21}H_{21}$	9-Heneicosene $C_{21}H_{42}CH:CHC_{19}H_{38}$	264.32	3	202 ¹¹	0.805 ¹⁸	
5691	$C_{21}H_{21}O_2$	Cluytine acid	326.32	69			
5692	$C_{21}H_{21}O_2$	Heneicosonic acid $CH_3(CH_2)_{19}CO_2H$	326.32	74			
5693	$C_{21}H_{21}NO$	Heneicosamide $CH_3(CH_2)_{19}CONH_2$	325.34	110			
5694	$C_{21}H_{21}$	<i>n</i> -Heneicosane $CH_3(CH_2)_{19}CH_3$	296.34	40.4	215 ¹⁸	0.775 ^{44, 18}	1067
5695	$C_{21}H_{21}$	Picene	278.11	364	520		
5696	$C_{21}H_{21}N_3O$	Rosindon (Rosindulon)	322.12	262			
5697	$C_{21}H_{21}NO_4$	Colchicine	389.12	146			
5698	$C_{21}H_{21}N_3$	Rosinduline	321.14	199			
5699	$C_{21}H_{21}O_4$	α -Cresolphthalein	346.14	216			
5700	$C_{21}H_{21}O_{11}$	Carminic acid	492.15	130 d.			
5701	$C_{21}H_{21}O_{11}$	Isotrifolin	462.17	250			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5702	C ₂₂ H ₃₃ O ₁₁	Trifolin	462.17	260			
5703	C ₂₂ H ₃₃ NO ₇	Gnoscapone	413.19	233			
5704	C ₂₂ H ₃₃ NO ₇	Narcotine	413.19	175		1.374	
5705	C ₂₂ H ₃₃ N ₃ O ₇	Pyrene pierate	431.42	218			
5706	C ₂₂ H ₃₃ O ₁₀	Sakuranin	448.19	212			
5707	C ₂₂ H ₃₃ NO ₄	Corycavidine	367.20	213			
5708	C ₂₂ H ₃₃ NO ₄	<i>l</i> -Colchicine	399.20	146			1333
5709	C ₂₂ H ₃₃ N ₂ O ₂	Apoyohimbine	350.22	252			
5710	C ₂₂ H ₃₃ N ₂ O ₃	Acetylquimine	366.22	108			
5711	C ₂₂ H ₃₃ N ₂ O ₃	Gelsenune	366.22	178			
5712	C ₂₂ H ₃₃ N ₂ O ₄	Chaimaridine	382.22	128			
5713	C ₂₂ H ₃₃ N ₂ O ₄	Chaimarine	382.22	233			
5714	C ₂₂ H ₃₃ N ₂ O ₄	Conchamarine	382.22	120			
5715	C ₂₂ H ₃₃ N ₂ O ₄	Conchaimaridine	382.22	115			
5716	C ₂₂ H ₃₃ N ₂ O ₄	Mitraversine	382.22	237			
5718	C ₂₂ H ₃₃ O ₁₂	Hesperidin	482.20	171	251 d.		
5719	C ₂₂ H ₃₇ AsNO ₃	Strychnine methylarsinate	460.18	60 d			
5720	C ₂₂ H ₃₇ BrN ₂ O ₂	Gelsenmine hydrobromide	417.14				1333
5721	C ₂₂ H ₃₇ ClN ₂ O ₂	Apoyohimbine hydrochloride	386.68	300			
5722	C ₂₂ H ₃₇ ClN ₂ O ₃	Gelsenmine hydrochloride	402.68	330			1333
5723	C ₂₂ H ₃₇ NO ₄	<i>dl</i> -Corydaine	369.22	136			
5724	C ₂₂ H ₃₇ N ₄ O ₃	Physostigmine salicylate	413.23	178.9			1333
5725	C ₂₂ H ₃₈ N ₂ O ₂	Aspidosamine	352.23	100			
5726	C ₂₂ H ₃₈ N ₂ O ₂	Aspidospermatine	352.23	162			
5727	C ₂₂ H ₃₈ N ₂ O ₄	Ditame (Echitamine)	381.23	206			1333
5728	C ₂₂ H ₃₈ N ₂ O ₄	Quinine acetate	381.23	120			
5729	C ₂₂ H ₃₈ N ₄	Camphorosazone	318.25	55			
5730	C ₂₂ H ₃₈ O ₃	Santalyl salicylate	310.22		126.6 ²⁰	1.070 ¹⁸	
5732	C ₂₂ H ₃₉ IO ₂	Europhen (Dnsobutyl- <i>p</i> -cresol iodide)	452.16	110			
5733	C ₂₂ H ₄₀ N ₂ O ₂	Aspidospermum	354.25	208	220 ²		
5734	C ₂₂ H ₄₁ NO ₅ (?)	Mitragynine	389.25	106	240 ⁵		
5735	C ₂₂ H ₄₂ O ₃	Anacardic acid	344.25	26			
5736	C ₂₂ H ₄₂ O ₄	Digitoxigenin	366.25	230			
5737	C ₂₂ H ₄₂ O ₄	Gemm	392.25	206			
5738	C ₂₂ H ₄₃ NO ₃	Atropine isovalerate	391.26	32			
5739	C ₂₂ H ₄₃ NO ₃	Atropine valerate	391.26	42			1333
5741	C ₂₂ H ₄₄ N ₄ O ₈ S	Pilocarpine sulfate	514.36	132			1333
5742	C ₂₂ H ₄₅ NO ₄	Delphinine	409.28	187.5			
5743	C ₂₂ H ₄₆ O ₄	Bryonol	364.28	212			
5744	C ₂₂ H ₄₆ O ₄	Capsularin	428.28	176			
5745	C ₂₂ H ₄₇ NO	Palmitic anilide	331.29	90.5	284 ¹⁷		
5746	C ₂₂ H ₄₈ O	Cholestol	318.29	139	360		
5747	C ₂₂ H ₄₈ O	Illicyl alcohol	318.29	175	350		
5748	C ₂₂ H ₄₈ O ₄	Citrullol	366.29	290			
5759	C ₂₂ H ₄₈ O ₄	Di- <i>l</i> -menthyl oxalate	366.29	68	225 ¹²		
5760	C ₂₂ H ₄₉ ClO	Behenolyl chloride C ₂₁ H ₄₉ COCl	354.76	29			
5761	C ₂₂ H ₄₉ O ₂	Behenic acid C ₂₁ H ₄₉ CO ₂ H	336.31	57.5			
5762	C ₂₂ H ₄₉ NO	Behenolyl amide C ₂₁ H ₄₉ CONH ₂	335.32	90			
5763	C ₂₂ H ₄₉ O ₂	Brassicic acid	338.32	61.5	282 ²⁰	0.859 ^{17.1}	1085
5764	C ₂₂ H ₄₉ O ₂	Erucic acid	338.32	33.5	281 ¹⁰	0.860 ^{18.4}	
5765	C ₂₂ H ₄₉ O ₃	14-Ketobehenic acid	354.32	84			
5765.1	C ₂₂ H ₄₉ O ₃	Isobutyl ricinoleate	354.32		262 ⁹	0.903 ²²	980
5766	C ₂₂ H ₄₉ NO	Erucamide C ₂₁ H ₄₉ CONH ₂	337.34	83			
5767	C ₂₂ H ₄₉ O	Erucyl alcohol	324.34	34.6	200 ^{9.2}		
5768	C ₂₂ H ₄₉ O ₂	Behenic acid	340.34	84	300 ⁶⁰		
5769	C ₂₂ H ₄₉ O ₂	Methyl heneicosate C ₂₀ H ₄₁ CO ₂ CH ₃	340.34	49			
5770	C ₂₂ H ₄₉ I	Docosyl iodide CH ₃ (CH ₂) ₂₀ CH ₂ I	436.28	40			
5771	C ₂₂ H ₄₉ NO	Behenamide C ₂₁ H ₄₉ CONH ₂	339.36	112			
5772	C ₂₂ H ₄₉	<i>n</i> -Docosane CH ₃ (CH ₂) ₂₀ CH ₃	310.35	44.4	224.5 ¹⁰	0.778 ^{44.4}	
5773	C ₂₂ H ₄₉ O	Docosyl alcohol CH ₃ (CH ₂) ₂₀ CH ₂ OH	326.35	74			
5774	C ₂₂ H ₄₉ O ₂	Amaric anhydride	328.15	140.5			
5775	C ₂₂ H ₄₉ NO ₄	Corycavine	409.19	216			
5776	C ₂₂ H ₄₉ N ₂ O ₄	Buphnatine	424.20	240			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5777	$C_{21}H_{24}N_4O_2$	Methylenedantipyrine	388.22	177			
5778	$C_{21}H_{24}N_4O_{11}$	Hyoscyne picrate	532.22	188			
5779	$C_{21}H_{24}O_4$	<i>o</i> -Cresol orthoacetate	348.19	89			
5780	$C_{21}H_{24}O_5$	Pteropodophyllin	444.19	227			
5781	$C_{21}H_{24}O_5$	Podophyllotoxin	444.19	94			
5782	$C_{21}H_{23}NO_4$	Lanthopine	379.20	200			
5783	$C_{21}H_{26}ClN_4O_2$	Aconitine	427.68	178			
5784	$C_{21}H_{26}N_2O_4$	Arcine	394.22	188 d.			
5785	$C_{21}H_{26}N_2O_4$	Brucine	394.22	178			
5786	$C_{21}H_{26}N_2O_4$	Concussone	394.22	208			
5787	$C_{21}H_{26}N_2O_4$	Cuscone	394.22	110			
5788	$C_{21}H_{26}N_2O_5$	Allobrucine oxide	410.22	189			
5789	$C_{21}H_{27}NO_5$	Homatropine salicylate	413.22				1333
5790	$C_{21}H_{27}NO_5$	Narecine	445.22	170			
5791	$C_{21}H_{27}N_3O_7$	Brucine nitrate	457.23	230 d.			
5792	$C_{21}H_{28}ClNO_5$	Narecine hydrochloride	481.68	192			1333
5793	$C_{21}H_{28}N_2O_4$	Vellosine	396.23	189 d.			
5794	$C_{21}H_{28}NO_5$	Lobeline	351.23	131			
5795	$C_{21}H_{30}N_2O_4$	Quinine propionate	398.25	111			
5796	$C_{21}H_{30}N_2O_5$	<i>dl</i> -Quinine lactate	414.25	165.5			
5797	$C_{21}H_{30}N_2O_5$	<i>d</i> -Quinine lactate	414.25	175			
5798	$C_{21}H_{30}N_2O_5$	<i>l</i> -Quinine lactate	414.25	171			
5799	$C_{21}H_{31}NO_5$	Atisine	353.25	85			
5801	$C_{21}H_{31}N_2O_4$	Quinine ethyl carbonate (Equinine)	401.27	91			
5802	$C_{21}H_{31}N_2O_5$	Pyramidon acid camphorate	431.28	94			
5803	$C_{21}H_{34}O_5$	Lactucen (Lactucol acetate)	344.28	184			
5804	$C_{21}H_{34}O_5$	Calabarol	376.28	245			
5804.1	$C_{21}H_{35}N_2$	Conessine	342.31	125			1333
5805	$C_{21}H_{38}O_2$	Benzyl palmitate	346.29	36		0 914 ₂₅ ¹⁰	1079
5806	$C_{21}H_{38}O_4$	Anonol	378.29	298			
5807	$C_{21}H_{38}O_4$	Grindelol (Phytosterol glucoside)	378.29	257			
5808	$C_{21}H_{40}O$	Ambren	332.31	82			
5809	$C_{21}H_{40}O$	Xanthosterin	332.31	214			
5810	$C_{21}H_{40}O_4$	Di- <i>L</i> -menthyl malonate	380.31	62	170 ¹	0.944 ₄ ⁷⁰	
5811	$C_{21}H_{40}O_4$	Ipuranol	380.31	290			
5812	$C_{21}H_{42}O_2$	Methyl behenolate $C_{21}H_{42}CO_2CH_3$	350.32	22			
5813	$C_{21}H_{44}O_2$	Methyl erucate $C_{21}H_{44}CO_2CH_3$	352.34		222 ⁹	0 870	457
5814	$C_{21}H_{44}O$	Laurone ($C_{11}H_{22}$) ₂ CO	338.35	69		0 789 ₄ ^{90.9}	1111
5815	$C_{21}H_{44}O_2$	Methyl behenate $C_{21}H_{44}CO_2CH_3$	354.35	54 5	225		
5816	$C_{21}H_{46}$	<i>n</i> -Tricosane $CH_3(CH_2)_{21}CH_3$	324.37	47 7	320 7	0 779 ₄ ^{47 7}	1120
5817	$C_{21}H_{46}$	Crackene	306.14	308	500		
5818	$C_{21}H_{11}$	1, 3, 5-Triphenylbenzene	306.14	170		1 206	1317
5819	$C_{21}H_{15}As_2N_2O$	Phenarsazine oxide	500.08	350			
5820	$C_{21}H_{15}N_2$	<i>p</i> , <i>p'</i> -Diphenylazobenzene	334.16	250			
5821	$C_{21}H_{15}N_2O$	<i>p</i> , <i>p'</i> -Diphenylazoxybenzene	350.16	205			
5822	$C_{21}H_{19}N_2$	<i>p</i> , <i>p'</i> -Diphenylhydrazobenzene	336.17	247			
5823	$C_{21}H_{20}O_4$	Glycerol tribenzoate	404.15	76 5			
5824	$C_{21}H_{20}O_5$	Glycerol trisalicylate	452.15	79			
5826	$C_{21}H_{23}N_2O$	Benzoylauramine	371.22	179			
5829	$C_{21}H_{23}O_5$	Diguaiacyl camphorate	412.22	124			
5830	$C_{21}H_{23}O_5$	α -Flavaspodic acid	444.22	92			
5831	$C_{21}H_{23}O_5$	β -Flavaspodic acid	444.22	156			
5832	$C_{21}H_{25}NO_5$	Atropine salicylate	427.23				1333
5834	$C_{21}H_{25}O_5$	Elaetone	398.23	300			
5835	$C_{21}H_{26}O_7$	Anthamantin	430.23	79			
5836	$C_{21}H_{26}O_{13}$	Scopolin	558.23	218			
5837	$C_{21}H_{27}N_2O_4$	Quinine butyrate	412.26	77.5			
5838	$C_{21}H_{27}N_4O_4$	Maltosazone	520.28	206			
5839	$C_{21}H_{27}N_3O$	Holarrenine	370.31	198			
5840	$C_{21}H_{28}O_4$	Di- <i>L</i> -bornyl succinate	390.29	83.7			
5841	$C_{21}H_{28}N_2$	Conessine	356.32	125			
5842	$C_{21}H_{40}O_4$	Choleic acid	392.31	190			
5843	$C_{21}H_{40}O_4$	Cucurbitol	392.31	260			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5844	C ₃₁ H ₄₆ O ₃	Cholic acid	408 31	195			
5845	C ₃₁ H ₄₇ NO	Stearic amide CH ₃ (CH ₂) ₁₈ CONHC ₂ H ₅	350 32	93 d			
5846	C ₃₁ H ₄₈ O ₄	Di- <i>L</i> -menthyl succinate	394 32	63	220 d	0 947 ¹¹	
5847	C ₃₁ H ₄₈ O ₄	Di- <i>L</i> -menthyl <i>d</i> -tartrate	426 32	75		1 054	
5848	C ₃₁ H ₄₈ O ₄	Di- <i>L</i> -menthyl <i>l</i> -tartrate	426 32	42		1 045 ¹⁴	
5849	C ₃₁ H ₄₈ O ₃	Lithofellinic acid	412 34	206			
5850	C ₃₁ H ₄₈ I ₂ O ₂	Ethyl diiodobrassidate	618 20	37			
5851	C ₃₁ H ₄₈ O ₂	Ethyl behenolate C ₂₁ H ₄₂ CO ₂ C ₂ H ₅	364 34	15			
5852	C ₃₁ H ₄₈ O ₂	Ethyl brassidate	366 35	30 5			1046
5853	C ₃₁ H ₄₈ O ₂	Ethyl erucate C ₂₁ H ₄₀ CO ₂ C ₂ H ₅	366 35		230	0 865	440
5854	C ₃₁ H ₄₈ O ₂	Carnaubic acid	368 37	72			
5855	C ₃₁ H ₄₈ O ₂	Lignoceric acid C ₂₉ H ₅₈ CO ₂ H	368 37	81			
5856	C ₃₁ H ₄₈ O ₂	Paraffinic acid C ₂₉ H ₅₈ CO ₂ H	368 37	46			
5857	C ₃₁ H ₄₈ O ₂	Pisangerylic acid C ₂₉ H ₅₈ CO ₂ H	368 37	72			
5858	C ₃₁ H ₄₈ O ₂	Tetraconic acid CH ₃ (CH ₂) ₁₈ CO ₂ H	368 37	85 5			
5859	C ₃₁ H ₄₈ O ₂	Ethyl behenate C ₂₁ H ₄₀ CO ₂ C ₂ H ₅	368 37	50 5	231		
5860	C ₃₁ H ₄₈	Isotetraconane	338 39	51	243 ¹⁵		
5861	C ₃₁ H ₄₈	<i>n</i> -Tetraconane CH ₃ (CH ₂) ₂₇ CH ₃	338 39	51	321 1	0 770 ¹¹⁻¹	
5862	C ₃₁ H ₄₈ O	Carnaubyl alcohol C ₂₉ H ₅₈ OH	354 39	69			
5863	C ₃₁ H ₄₈	Tetraphenylmethane C(C ₆ H ₅) ₄	320 15	285	431		
5864	C ₃₁ H ₃₇ N ₃	Tetraphenylguanidine	363 19	131			
5865	C ₃₁ H ₃₈ O ₁₁	Ononin	502 20	210			
5866	C ₃₁ H ₃₈ O ₁₄	Gentiin	552 22	274			
5867	C ₃₁ H ₃₇ NO ₆ S	Codeine <i>o</i> -guaiacolsulfonate	503 30	165			
5868	C ₃₁ H ₃₂ O ₈	Albaspudin	460 25	147			
5869	C ₃₁ H ₃₂ O ₈	Aspidin	460 25	124			
5871	C ₃₁ H ₃₄ O ₁₄	Loganin	558 26	215			
5872	C ₃₁ H ₃₂ NO ₈	Pseudoaconine	481 31	95			
5873	C ₃₁ H ₄₀ O	Fungisterin	356 31	144			
5874	C ₃₁ H ₄₀ O	Humotaxasterol	356 31	164			
5875	C ₃₁ H ₄₀ O ₂	Benzyl oleate	372 31		237 ⁷	0 933 ¹¹	1024
5876	C ₃₁ H ₄₂ O ₂	Benzyl stearate C ₁₇ H ₃₅ CO ₂ CH ₂ C ₆ H ₅	374 32	45 8		0 908 ¹²	1078
5877	C ₃₁ H ₄₄ O ₄	Di- <i>L</i> -menthyl glutarate	408 34		243 ²⁰		
5878	C ₃₁ H ₄₀ O ₂	Neocerotic acid	382 39	77 8			
5879	C ₃₁ H ₄₀ O ₂	Hyenic acid	382 39	78			
5880	C ₃₁ H ₄₀ O ₃	Cerebronic acid	398 39	100			
5881	C ₃₁ H ₄₂	Pentacosane CH ₃ (CH ₂) ₂₇ CH ₃	352 40	54	284 ⁴⁰	0.779	
5882	C ₃₁ H ₃₄	Rubiene	326 11	306			
5883	C ₃₁ H ₃₀	Tetraphenylethylene	332 15	221	425		
5884	C ₃₁ H ₃₀ O	α -Benzopinacolone	348 15	205			
5885	C ₃₁ H ₃₀ O	β -Benzopinacolone	348 15	181			
5886	C ₃₁ H ₃₁ NO ₁₁	Aconine	523 17	132			
5887	C ₃₁ H ₃₂	1, 1, 2, 2-Tetraphenylethane	334 17	209	383	1 182	
5888	C ₃₁ H ₃₂ N ₄	Benzilosazone	390 20	225			
5889	C ₃₁ H ₃₂ O ₂	Benzopinacolone	366 17	186 d.			
5890	C ₃₁ H ₃₂ N ₃	Tetraphenylhguanidine	405 22	136			
5891	C ₂₈ H ₂₈ N ₂ O ₂	Benzoylcinchonine	398 22	106			
5892	C ₂₈ H ₂₇ ClN ₂ O ₂	Benzoylcinchonine hydrochloride	434 68	207			
5893	C ₂₈ H ₂₈ N ₂ O ₄	Cinchonidine salicylate	432 23	70			
5895	C ₂₈ H ₂₈ O ₁₄	Ruberythric acid	564 22	260			
5896	C ₂₈ H ₂₈ O ₁₄	Morindin	564 22	245	247		
5897	C ₂₈ H ₂₈ N ₂ O ₆ S	Quinine phenolsulfonate	498 31				1333
5898	C ₂₈ H ₃₀ O ₄	Bixin	406 23	189			
5899	C ₂₈ H ₃₂ N ₂ O ₂	Ibogine	404 26	152			
5900	C ₂₈ H ₃₇ NO ₃	Jervine	411 29	241			
5901	C ₂₈ H ₃₈	Carotin	350 29	167 8			
5902	C ₂₈ H ₄₀ O	Ergosterin	368 31	154	185 ²⁰	1.040	
5903	C ₂₈ H ₄₀ O ₇	Laserpitin	464 31	117 5	240 ¹⁰ d.		
5904	C ₂₈ H ₄₁ NO ₁₀	Japconine	527 32	97			
5905	C ₂₈ H ₄₂ O ₃	Sarsasapogenin	402 32	183			
5906	C ₂₈ H ₄₂ O ₃	Smilacin	402 32	160 d.			
5907	C ₂₈ H ₄₂ NO ₂	Rubijervine	401 34	236			
5908	C ₂₈ H ₄₂ NO ₆	Glycocholic acid	465 34	134			

No	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No
5009	$C_{28}H_{48}O$	Carlosterol	372.34	159			
5010	$C_{28}H_{48}O_2$	Onocerin	388.34	232			
5011	$C_{28}H_{48}O_4$	Gitogenin	420.34	272			
5012	$C_{28}H_{48}O_{10}$	Parillin	516.34	176.1			
5013	$C_{28}H_{48}NO_5$	Protoveratridine	499.36	265			
5014	$C_{28}H_{48}O$	Mochyl alcohol $C_{28}H_{48}OH$	374.35	234			
5015	$C_{28}H_{48}O_4$	Di- <i>L</i> -menthyl salicylate	422.35	61			
5016	$C_{28}H_{48}O_2$	Cerotic acid	396.40	82.5		0.836 ₄ ²⁰	
5017	$C_{28}H_{48}O_2$	Ethyl hipoecerate	396.40	56	310 ²⁰		
5018	$C_{28}H_{48}$	<i>n</i> -Hexacosane $CH_3(CH_2)_{24}CH_3$	366.42	60	296 ⁴⁰	0.779	
5019	$C_{28}H_{48}$	Isohexacosane	366.42	61	207 ⁴⁰		
5020	$C_{28}H_{48}O$	Ceryl alcohol $C_{28}H_{48}OH$	382.42	80			
5021	$C_{27}H_{45}Br_2N_2O_6$	Quinine dibromosalicylate	620.06	198			
5022	$C_{27}H_{45}N_2S_3$	Diphenylguanidine trithiocarbonate	532.46	89			
5025	$C_{27}H_{45}N_2O_5$	Quinine salicylate	462.25	187			1333
5026	$C_{27}H_{45}O_{15}$	Apun	594.23	228			
5027	$C_{27}H_{45}O_{11}$	Sophorn	610.23	166			
5028	$C_{27}H_{45}O_{10}$	Rutin	612.25	183	d.		
5029	$C_{27}H_{45}O_7$	Strophantidin	474.29	195			
5030	$C_{27}H_{45}N_8O_8$	Paucine	513.34	126			
5031	$C_{27}H_{45}O_8$	Cerberin	492.31	192			
5032	$C_{27}H_{45}O$	Ergosterin	382.32	165			
5033	$C_{27}H_{45}O$	Cholesterin	386.35	148	> 360	1.067	
5034	$C_{27}H_{45}O$	Phytosterol	386.35	136			
5035	$C_{27}H_{45}O$	Sitosterol	386.35	140			
5036	$C_{27}H_{45}O_7$	Atroputin	402.35	285			
5037	$C_{27}H_{45}N$	Cholesterylamine	385.37	104			
5038	$C_{27}H_{47}NO_9$	Indaconine	529.37	94			
5039	$C_{27}H_{45}O$	Coprosterol	388.37	105			
5040	$C_{27}H_{45}O_8$	Treaprylin	470.39	8		0.954	425
5041	$C_{27}H_{45}O$	Myristone $(C_{13}H_{27})_2CO$	394.42	76		0.792 ₄ ²⁰ 9	
5042	$C_{27}H_{45}$	<i>n</i> -Heptacosane $CH_3(CH_2)_{24}CH_3$	380.43	59.5	270 ⁴⁵	0.779 ₄ ²⁰ 4	
5043	$C_{28}H_{44}$	9, 9'-Dianthamyl	354.44	300			
5044	$C_{28}H_{40}N_2$	Amaron (Tetraphenylpyrazine)	384.47	240			
5045	$C_{28}H_{44}N_2O$	Benzoylamarin	402.49	180			
5046	$C_{28}H_{42}O_2$	Anthrapaicone	390.47	182 d.			
5047	$C_{28}H_{44}N_2$	Benzylamarin	388.20	124			
5048	$C_{28}H_{42}N_2O_8$	Strychnine salicylate	472.23				1333
5049	$C_{28}H_{40}O_2$	Columbin	398.23	182			
5050	$C_{28}H_{44}O_{11}$	Phillrin	549.26	160			
5051	$C_{28}H_{46}N_2O_4$	Ipecamine	461.29	90			
5052	$C_{28}H_{46}N_2O_4$	Psychotrine	464.29	138			
5053	$C_{28}H_{46}O_7$	Digitogenic acid	484.28	210			
5054	$C_{28}H_{46}N_2O_4$	Cephaeline	466.31	99			
5055	$C_{28}H_{46}N_2O_4$	Hydroipeamine	466.31	92			
5056	$C_{28}H_{46}O_7$	α -Elatein	486.29	232			
5057	$C_{28}H_{46}O_7$	β -Elatein	486.29	195			
5058	$C_{28}H_{44}O_2$	Lactucerin	412.34	210			
5059	$C_{28}H_{46}NO$	Behenole amide $C_{21}H_{43}CONHC_6H_5$	411.36	72			
5060	$C_{28}H_{46}NO_9$	Isopyrone	540.36	160			
5061	$C_{28}H_{46}O_2$	Cholesteryl formate	414.35				1216
5062	$C_{28}H_{46}NO$	Brassicic amide $C_{21}H_{43}CONHC_6H_5$	413.37	78			
5063	$C_{28}H_{46}NO$	Erucic amide $C_{21}H_{43}CONHC_6H_5$	413.37	66			
5064	$C_{28}H_{46}O_{10}$	Citalin	544.37	253			
5065	$C_{28}H_{46}NO$	Behenic amide $CH_3(CH_2)_{26}CONHC_6H_5$	415.39	102			
5066	$C_{28}H_{46}O_2$	<i>L</i> -Menthyl stearate	422.42	39			
5067	$C_{28}H_{46}$	Octacosane $CH_3(CH_2)_{26}CH_3$	394.45	65	318 ⁴⁰	0.779	
5068	$C_{28}H_{46}O$	Cluytyl alcohol	410.45	82.5			
5069	$C_{29}H_{42}O_4$	Fortoin (Methylenedecotoine)	500.49	213			
5070	$C_{29}H_{42}O_{12}$	Aromadendrin	566.20	216			
5071	$C_{29}H_{42}N_2O_8$	Quinine acetylsalicylate	504.26	157			
5072	$C_{29}H_{44}NO_7$	Paniculatin	509.28	263			
5073	$C_{29}H_{46}N_2O_4$	Emetamine	476.29	156			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5974	C ₁₉ H ₁₆ N ₂ O ₄	Isoemetine	480.32	98			
5975	C ₁₉ H ₁₆ Cl ₂ N ₂ O ₄	Isoemetine hydrochloride	553.26	310 d			
5976	C ₁₉ H ₁₆ NO ₇	Pseudojervine	517.34	307			
5977	C ₁₉ H ₁₆ NO ₈	Sabadenine	533.34	160	197 d		1333
5978	C ₁₉ H ₁₆	Spinacene	396.37	20	260 ^a	0.850 ²⁰	570
5979	C ₁₉ H ₁₆ O	Taraxasterol	412.37	222			
5980	C ₁₉ H ₁₆ O ₃	Phytosterol acetate	445.38	122			
5981	C ₁₉ H ₁₆ O ₄	Cluytianol	478.39	300			
5982	C ₁₉ H ₁₆ NO ₈	Sabadine	541.40	210			
5983	C ₁₉ H ₁₆ O ₂₀	Sapotin	720.40	210			
5984	C ₁₉ H ₁₆ O ₂	Montane acid	438.45	86.8			
5985	C ₁₉ H ₁₆	Nonacosane CH ₃ (CH ₂) ₂₃ CH ₃	408.46	63.6	348 ⁶⁰	0.780	
5986	C ₁₉ H ₁₆ NO ₉	Adlumidine	538.46	234			
5987	C ₁₉ H ₂₂ O ₁₀	Santalol	548.22	226	195 ^a		
5989	C ₁₉ H ₁₆ O ₁₃	Picrotoxin	602.26	200			
5990	C ₁₉ H ₁₆ O ₄	Helleborosin	462.29	150 d			
5991	C ₁₉ H ₁₆ N ₂ O ₅	Emetine	508.32	74			
5993	C ₁₉ H ₁₆ Cl ₂ N ₂ O ₆	Emetine dihydrochloride	581.26	53			1333
5994	C ₁₉ H ₁₆ I ₂ N ₂ O ₆	Emetine dihydriodide	761.20	238			
5995	C ₁₉ H ₁₆ N ₂ O ₁₈ S ₂	Sinalbin	731.47	138.5			
5996	C ₁₉ H ₁₆ N ₆ O ₆ S	Physostigmine sulfate	648.45	140			
5997	C ₁₉ H ₁₆ O ₉	Cymarin	548.34	138 d			
5998	C ₁₉ H ₁₆ O ₁₂	Ouabain	598.35	185			
5999	C ₁₉ H ₁₆ O ₂	Echicern	440.37	157			
6000	C ₁₉ H ₁₆ O ₂	Mycosterol	440.37	160			
6001	C ₁₉ H ₁₆ O ₈	β-Quinovin	536.37	235			
6002	C ₁₉ H ₁₆ O	α-Amyrin	426.39	185	>300		
6003	C ₁₉ H ₁₆ O	β-Amyrin	426.39	195			
6004	C ₁₉ H ₁₆ O	Androsterol	426.39	208			
6005	C ₁₉ H ₁₆ O	Stigmasterol	426.39	140			
6006	C ₁₉ H ₁₆ O ₂	Betulin	442.39	252			
6007	C ₁₉ H ₁₆ O ₂	Cholesterol propionate	442.39	98.7			
6008	C ₁₉ H ₁₆ O ₄	Menthyl camphorate	476.40	86			
6009	C ₁₉ H ₁₆ N ₄ O ₆ S	Spartene sulfate	566.51				1333
6010	C ₁₉ H ₁₆	Melene	420.46	63	380	0.890	
6011	C ₁₉ H ₁₆ O ₂	Melissic acid CH ₃ (CH ₂) ₂₃ CO ₂ H	452.46	91			
6012	C ₁₉ H ₁₆ O ₄	Lanoceric acid	484.46	105			
6013	C ₁₉ H ₁₆	Melissane	422.48	74	222 ^{10,4}		
6014	C ₁₉ H ₁₆	n-Triacontane CH ₃ (CH ₂) ₂₈ CH ₃	422.48	70	235 ¹⁰	0.780	
6015	C ₁₉ H ₁₆ O	Melissyl alcohol	438.48	88		0.777 ¹⁰	
6016	C ₁₉ H ₁₆ O ₂	Cocceryl alcohol	454.48	104			
6017	C ₁₉ H ₁₆ NO ₄	Apomorphine dibenzoate	465.42	156			
6018	C ₁₉ H ₁₆ O ₁₀	Tephrosin	558.20	187			
6019	C ₁₉ H ₁₆ NO ₆	Dibenzoylmorphine	493.22	190.5			
6020	C ₁₉ H ₁₆ O ₁₀	Kosin	570.29	142			1333
6021	C ₁₉ H ₁₆ NO ₁₁	Napelline	603.36	165			
6022	C ₁₉ H ₁₆ O	Lupeol	431.33	170			
6023	C ₁₉ H ₁₆ O	Lupcol	438.39	215			
6024	C ₁₉ H ₁₆ O ₂	Cholesterol butyrate	456.40	92.8			
6025	C ₁₉ H ₁₆ O ₂	Euonysterol	456.40	138			
6026	C ₁₉ H ₁₆ O	Palmitone (C ₁₆ H ₃₁) ₂ CO	450.48	83		0.795 ^{20,9}	1125
6027	C ₁₉ H ₁₆ O ₃	Cocceric acid	482.48	93			
6028	C ₁₉ H ₁₆	n-Hentriacontane CH ₃ (CH ₂) ₂₉ CH ₃	436.49	68.1	302 ¹⁵	0.781 ^{15,1}	
6029	C ₁₉ H ₁₆ O ₁₀	Heraclin	566.47	185			
6030	C ₁₉ H ₁₆	Pentaphenylethane	410.20	173			
6031	C ₁₉ H ₁₆ N ₂ O	Benzacine	469.23	150			
6032	C ₁₉ H ₁₆ NO ₃	Pyraconitine	583.32	171			
6032.1	C ₁₉ H ₁₆ N ₂ O ₃	Lappaconitine	598.34	223			
6033	C ₁₉ H ₁₆ N ₂ O ₁₀ S	Homatropine sulfate	648.42				1333
6034	C ₁₉ H ₁₆ O ₁₀	Quassin	588.34	211			
6035	C ₁₉ H ₁₆ NO ₃	Indobenzacanine	587.36	130			
6036	C ₁₉ H ₁₆ BrNO ₁₀	Benzacanine hydrobromide	684.28	282			
6037	C ₁₉ H ₁₆ ClNO ₁₀	Benzacanine hydrochloride	639.82	α 217; β 268			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I No
0038	C ₁₁ H ₁₆ N ₂ O ₁₀ S	Sinapine sulfate	716 45	193			
0039	C ₁₁ H ₁₆ NO ₈	Veratrine	591 39	205			
0040	C ₁₁ H ₁₆ NO ₁₁	Protoveratrine	625 40	250			
0041	C ₁₁ H ₁₅ N ₃ O ₄	Lycopodine	512 42	115			
0042	C ₁₁ H ₁₆ O ₂	Echitin	468 40	170			
0043	C ₁₁ H ₁₆ O ₄	Cholesterol valerate	470 42	89 6			
0044	C ₁₁ H ₁₆ O ₂	Phytosterol valerate	470 42	30			
0045	C ₁₁ H ₁₆ O ₃	Palmitic anhydride (C ₁₅ H ₃₁ CO) ₂ O	494 48	64			
0046	C ₁₁ H ₁₆ O ₁₄	Convulxin (Rhodeoretin)	702 48	158			
0047	C ₁₁ H ₁₆ O ₂	Cetyl palmitate C ₁₅ H ₃₁ CO ₂ C ₁₅ H ₃₁	480 49	54		0 832 ₄ ⁰	
0048	C ₁₁ H ₁₆	<i>n</i> -Dotriacontane CH ₃ (CH ₂) ₃₀ CH ₃	450 51	75	310 ¹⁵	0 775 ^{19,4}	1110
0049	C ₁₁ H ₁₆ O ₁₉	Robinin	740 31	195			
0050	C ₁₁ H ₁₆ NO ₁₁	Anhydroaconitine	629 34	186			
0051	C ₁₁ H ₁₆ N ₂ O ₈	Septentrionaline	614 37	131			
0052	C ₁₁ H ₁₆ O ₁₀	Tormentol	606 39	228			
0053	C ₁₁ H ₁₆ NO ₇	Solanguistine	575 42	235 d.			
0054	C ₁₁ H ₁₆ O ₂	Cholesterol capionate	484 43	91 2			
0055	C ₁₁ H ₁₆ O ₄	Phytosteroline	548 43	290			
0056	C ₁₁ H ₁₆ O ₄	Triacprin	554 48	31 1		0 921 ₄ ¹⁰	1054
0057	C ₁₁ H ₁₆ O ₂	Psylostearylic acid	494 51	95			
0058	C ₁₁ H ₁₆ O	Psylostearyl alcohol	480 52	69 5			
0059	C ₁₁ H ₁₂ O ₄	Isoeugenol dibenzoate	536 25	161			
0060	C ₁₁ H ₁₆ N ₂ O ₈	Pseudomorphine	568 29	327 d.			
0061	C ₁₁ H ₁₆ N ₂ O ₈	Sekisanine	616 29	200			
0062	C ₁₁ H ₁₆ N ₂ O ₁₀ S	Morphine sulfate	668 39	250 d.			1333
0063	C ₁₁ H ₁₆ N ₂ O ₁₂ S ₂	Quinine diguanacolsulfonate	732 45	130 d.			
0064	C ₁₁ H ₁₆ N ₂ O ₈ S	Apoptropine sulfate	640 42				1333
0065	C ₁₁ H ₁₆ O ₄	<i>d</i> -Camphor salicylate	580 34	60			
0066	C ₁₁ H ₁₆ NO ₁₀	Indaconitine	629 37	203			
0067	C ₁₁ H ₁₆ NO ₁₁	Aconitine	645 37	195			
0068	C ₁₁ H ₁₆ BrNO ₁₁	Aconitine hydrobromide	726 29	163			1333
0069	C ₁₁ H ₁₆ ClNO ₁₁	Aconitine hydrochloride	681 84	149			1333
0070	C ₁₁ H ₁₆ N ₂ O ₁₀ S	Atropine sulfate	676 45	194			1333
0071	C ₁₁ H ₁₆ N ₂ O ₁₀ S	Hyoscyamine sulfate	676 45	206			1333
0072	C ₁₁ H ₁₆ N ₂ O ₁₄	Aconitine nitrate	708 39				1333
0073	C ₁₁ H ₁₆ NO ₁₁	Japaeconitine	647 39	204 2			
0074	C ₁₁ H ₁₆ ClNO ₁₁	Japaeconitine hydrochloride	683 85	149			
0075	C ₁₁ H ₁₆ O ₂	Cholesterol benzoate	490 39	145 5			
0076	C ₁₁ H ₁₆ O ₄	Cholesterol salicylate	506 39	180			1180
0077	C ₁₁ H ₁₆ O ₁₁	Digitoxin	638 12	244			
0078	C ₁₁ H ₁₆ O ₁₆	Jalapin	720 43	150			
0079	C ₁₁ H ₁₇ NO ₂	Solanidine	511 45	215			
0080	C ₁₁ H ₁₇	<i>n</i> -Tetraatriacontane	478 54	76 5	255 ¹ 0	0 781	
0081	C ₁₁ H ₁₇ O	Incanatryl alcohol	494 51	74			
0082	C ₁₁ H ₁₈ O ₁₂	Filixic acid	650 29	184			
0083	C ₁₁ H ₁₈ N ₂ O ₈	Ergotinine	609 34	229 d.			1333
0084	C ₁₁ H ₁₈ N ₂ O ₈	Ergotoxine	627 36	164			
0085	C ₁₁ H ₁₈ N ₂ O ₁₀ P	Ergotoxine phosphate	725 40	187			
0086	C ₁₁ H ₁₈ O ₂	Echretin	508 43	52			
0087	C ₁₁ H ₁₈ O ₁₄	Digitalin	700 43	217			
0088	C ₁₁ H ₁₈ O ₄	Phytosterolene acetate	607 45	100			
0089	C ₁₁ H ₁₈ NO ₄	Imperialine	558 47	254 d.			
0090	C ₁₁ H ₁₈ O	Stearone (C ₁₇ H ₃₅) ₂ CO	506 54	88		0 793 ₄ ²⁴	
0091	C ₁₁ H ₁₇	<i>n</i> -Pentatriacontane	492 55	74 7	331 ¹⁵	0 782 ₄ ^{14,7}	
0092	C ₁₁ H ₁₈ O ₈	Lophopetalin	533 01	230			
0093	C ₁₁ H ₁₈ N ₂ O ₈ S	Aporphine sulfate	654 34	75			
0094	C ₁₁ H ₁₈ N ₂ O ₁₃	Cynoctonine	702 28	137			
0095	C ₁₁ H ₁₈ O ₈	Helleborm	570 32	> 250 d			
0096	C ₁₁ H ₁₈ O ₁₃	Filixic acid	682 32	125			
0097	C ₁₁ H ₁₈ N ₂ O ₁₀ S	Codeine sulfate	696 42	278			1333
0098	C ₁₁ H ₁₈ O ₁₉	α -Pierasmin	640 37	204			
0099	C ₁₁ H ₁₈ O ₁₉	β -Pierasmin	640 37	212			
0100	C ₁₁ H ₁₈ N ₂ O ₈	Pyramidon camphorate	662 43	90			

No.	Formula	Name	Mol. wt	M. P.	B. P.	<i>d</i>	R. I. No.
6101	C ₂₅ H ₄₁ NO ₁₁	Bikhaconitine	673.40	113			
6102	C ₂₅ H ₄₁ NO ₁₂	Pseudaconitine	689.40	211			
6104	C ₂₅ H ₄₃ O ₁₁	Inulin	990.48	178 d		1.35	
6105	C ₂₅ H ₄₅ O ₅	Oleic anhydride	546.51	22.2			
6106	C ₂₅ H ₄₇ O ₅	Stearic anhydride [C ₁₇ (CH ₂) ₁₄ (CO) ₂ O]	550.54	72			
6107	C ₂₅ H ₄₇	Hexatriacontane	506.57	76.5	265.1°	0.7827°	
6108	C ₂₇ H ₄₅ N ₂ O ₅	Xanthaline	652.29	208			
6109	C ₂₇ H ₄₅ NO ₁₁	Taxine	685.40	82 d.			
6110	C ₂₇ H ₄₅ O ₂	Cholesterol caprylate	540.49	82.2			
6111	C ₂₈ H ₄₄ N ₂ O ₁₂	Morphine tartrate	720.36				1333
6112	C ₂₈ H ₄₄ N ₂ O ₅	Dicinchonine	588.37	10			
6113	C ₂₈ H ₄₄ N ₂ O ₈	α-Truxilline	658.37	80			
6114	C ₂₈ H ₄₄ N ₂ O ₈	β-Truxilline	658.37	45			
6115	C ₂₈ H ₄₄ N ₂ O ₆ S	Cinchonidine sulfate	686.45	242			
6116	C ₂₈ H ₄₄ N ₂ O ₆ S	Cinchonine sulfate	686.45	198.5			
6117	C ₂₈ H ₄₄ N ₂ O ₆ S	Cupreine sulfate	718.45	257 d.			
6119	C ₂₉ H ₄₄ NO ₁₂	Adlumine...	715.32	188			
6120	C ₂₉ H ₄₄ NO ₁₀	Zygadenine	705.49	200			
6120.1	C ₂₉ H ₄₇ O ₄	Trilaurin	638.57	46.5		0.8016°	
6122	C ₃₀ H ₄₆ N ₂ O ₁₀ S ₂	Quinine-β-naphtholsulfonate	772.45	186			
6124	C ₃₀ H ₄₆ N ₂ O ₆ S	Quinine sulfate	746.48	235.2			
6125	C ₃₀ H ₄₆ O ₁₅	Strophantin	776.43	179			
6126	C ₃₀ H ₇₀ O ₂	Homocucunysterol	582.54	134			
6127	C ₃₁ H ₅₀ N ₂ O ₇	Quinine carbonate	710.42	169			
6129	C ₃₁ H ₄₄ N ₂ O ₆ S	Strychnine sulfate	766.45	200			
6131	C ₃₂ H ₅₄ N ₂ O ₇	Tritopine	698.43	182			
6133	C ₃₃ H ₆₀ O ₆	Caulosapogenin	666.51	315			
6135	C ₃₃ H ₇₀ O ₂	Echitein...	606.54	195			
6136	C ₃₄ H ₅₄ N ₂ O ₂₄	Quinoline tartrate	987.37	125			
6137	C ₃₄ H ₅₄ N ₂ O ₁₀ P	Quinine glycerophosphate	820.50	181			
6138	C ₃₄ H ₅₄ N ₂ O ₈	Quinine succinate	766.45	192			
6139	C ₃₄ H ₅₄ N ₂ O ₈	Quinine malate	782.45	177.5			
6141	C ₃₄ H ₅₄ N ₂ O ₁₀	Quinine tartrate	798.45	202.5			1333
6142	C ₃₄ H ₅₄ NO ₁₉	Glycyrrhizic acid	910.50	220			
6143	C ₃₄ H ₇₀ O ₂₀	Sarsasaponin	924.59	248			
6144	C ₃₄ H ₅₈ O ₂	Brassicic anhydride	658.63	64		0.8357°	1145
6145	C ₃₄ H ₅₈ O ₂	Erucic anhydride	658.63	48			1144
6147	C ₃₄ H ₅₈ O ₆	Trimyrustin	722.66	55		0.8854°	1089
6148	C ₃₄ H ₅₈ N ₂ O ₁₀	Strychnine <i>d</i> -tartrate	818.42	228		1.420	
6150	C ₃₄ H ₅₈ N ₂ O ₂₀ S	Narceine sulfate	988.51				1333
6151	C ₃₇ H ₆₄ O ₁₄	Filmaron...	874.42	60			
6153	C ₃₈ H ₇₂ NO ₉	Phrenosin	827.72	215 s. d.			
6154	C ₃₈ H ₈₀ O ₂₂	Gitonin...	1036.6	272 d.			
6155	C ₃₈ H ₆₄ O ₂₀	Hyssopin...	1146.5	275			
6156	C ₃₈ H ₇₀ O ₈	Lupulinic acid	798.54	93			
6157	C ₃₈ H ₈₀ O ₆	Tripalmitin	806.76	65.1; 40		0.8667°	1114
6158	C ₃₈ H ₆₁ NO ₁₈	Solanine	1017.7	254 d.			
6159	C ₃₈ H ₆₁ ClNO ₁₈	Solanine hydrochloride	1054.2	212			
6160	C ₃₈ H ₇₀ O ₂	Ceryl cerotate	760.80	84			
6161	C ₃₈ H ₅₈ O ₁₇	Caulosaponin (Leontin)	1008.7	255			
6163	C ₃₈ H ₇₄ N ₂ O ₁₂ S	Psychotrine sulfate...	1026.7	217			
6164	C ₃₈ H ₆₀ O ₉	Caulophyllosapogenin	904.68	315			
6165	C ₃₇ H ₇₀ O ₈	Glycerol trielaidate	884.80	32			
6166	C ₃₇ H ₇₀ O ₈	Glycerol trioleate	884.80	-17	240.1°	0.915	
6167	C ₃₇ H ₇₀ O ₈	Glycerol triricinoleate	932.80			0.959	
6168	C ₃₇ H ₇₀ N ₂ O ₁₄	Pyosin...	1062.9	238			
6169	C ₃₇ H ₇₀ O ₆	Tristearin...	890.85	54.5; 70.8		0.8624°	1115
6170	C ₃₈ H ₆₀ O ₂₃	Fustin...	1110.4	219			
6172	C ₃₈ H ₇₀ O ₁₇	Caullophyllsaponin	1168.8	260			
6173	C ₃₈ H ₅₈ N ₂ O ₂₀ S	Aconitine sulfate	1388.8				1333
6175	C ₃₇ H ₅₈ N ₂ O ₂₀	Quinine citrate	1350.7	183.5			

III. Biaxial Group

Serial No	Gen. index No	Refractive index			Serial No	Gen. index No	Refractive index			Serial No	Gen. index No	Refractive index		
		α	β	γ			α	β	γ			α	β	γ
1190	679 1	1.367	1.409	1.536	1235	1688	1.545	1.546	1.837	1280	4330 1	1.561	1.618	
1191	361	1.4162	1.4603	1.5502	1236	786	1.547	1.547		1281	4752	1.621	1.629	1.661
1192	4184	1.402	1.463	1.617	1237	1530 1	1.548	1.548		1282	4913	1.590	1.633	1.640
1193	4218	1.407	1.468	1.620	1238	2916 1	1.550	1.550		1283	5317	1.620	1.651	1.656
1194	147	1.410	1.475	1.625	1239	853 1	1.559	1.555	1.582	1284	306		1.633	
1195	4397*		1.478		1240	988 1	1.546	1.559		1285	788		1.635	
1196	4368 31	1.471	1.479	1.510	1241	778	1.519	1.561	1.591	1286	5317*	1.543	1.636	1.684
1197	2920		1.484		1242	1996	1.5376	1.561	1.5705	1287	3585		1.637	
1198	2381	1.370	1.485	1.585	1243	1012	1.551	1.567	1.571	1288	5319	1.607	1.642	1.675
1199	5096 1		1.488		1244	3964		1.570		1289	5067 1	1.621	1.643	1.648
1200	2234 1		1.496		1245	1472	1.56	1.57	1.60	1290	3087	1.505	1.645	1.655
1201	4508 31	1.479	1.496	1.524	1246	3716	1.54	1.571	1.59	1291	4750	1.587	1.616	1.709
1202	1597*	1.493	1.498	1.509	1247	5113 1	1.544	1.572		1292	1111 1	1.626	1.646	1.712
1203	2808 1	1.487	1.499	1.566	1248	1034	1.555	1.573	1.577	1293	5082 1	1.612	1.647	1.662
1204	2260 1	1.488	1.504	1.527	1249	493 1	1.545	1.575	1.586	1294	5213 1		1.650	
1205	776		1.503		1250	3199	1.590	1.576	1.617	1295	5304	1.463	1.653	1.780
1206	270	1.445	1.505	1.540	1251	5477	1.510	1.578	1.618	1296	4748	1.621	1.654	1.691
1207	966		1.499		1252	3778	1.5345	1.578	1.5912	1297	1985	1.442	1.662	1.756
1208	961 1		1.510		1253	1011	1.55	1.581	1.598	1298	5561	1.580	1.665	1.690
1209	3742		1.512		1254	708	1.549	1.583	1.625	1299	1749	1.586	1.668	1.690
1210	4008	1.505	1.512	1.524	1255	3194	1.556	1.587	1.700	1300	1987	1.470	1.669	1.734
1211	5028 1	1.511	1.512	1.536	1256	3111	1.535	1.592	1.760	1301	5428 1	1.529	1.670	1.716
1212	2360 2	1.495	1.513	1.672	1257	5228	1.522	1.594	1.616	1302	1149	1.640	1.670	1.810
1213	947 1	1.500	1.515	1.545	1258	161	1.538	1.600	1.602	1303	3539	1.493	1.675	1.739
1214	3314		1.520		1259	3222	1.550	1.600	1.680	1304	5442	1.570	1.685	1.690
1215	975 1	1.413	1.520	1.580	1260	5048	1.580	1.600	1.610	1305	1111 2	1.619	1.688	1.696
1216	5061		1.524		1261	976		1.6015	1.6187	1306	2566 2	1.597	1.692	1.806
1217	2373 1	1.528	1.529	1.547	1262	1262	1.580 2	1.602	1.602	1307	4058	1.597	1.6935	1.7324
1218	1070 2	1.510	1.530	1.596	1263	4960		1.602	1.602	1308	84 1	1.431	1.698	1.713
1219	1672	1.523	1.531	1.534	1264	5320	1.574	1.602	1.647	1309	3103	1.470	1.710	1.810
1220	629	1.450	1.534	1.610	1265	4936 1	1.526	1.603		1310	4322	1.583	1.73	
1221	1705	1.525	1.535	1.590	1266	977	1.490	1.605	1.620	1311	445	1.490	1.743	1.872
1222	639	1.4975	1.5372	1.6045	1267	609 1	1.530	1.605	1.658	1312	4739	1.464	1.748	1.916
1223	67 1	1.4227	1.5358	1.5545	1268	3244	1.538	1.609	1.734	1313	1197	1.56	1.75	> 1.95
1224	638	1.495	1.536	1.605	1269	3208	1.600	1.610	1.675	1314	1200	1.650	1.760	1.870
1225	484	1.515	1.540	1.575	1270	1977	1.609	1.612	1.616	1315	1142	1.763	1.787	1.837
1226	5396	1.530	1.540	1.580	1271	3540	1.600	1.614	1.697	1316	87	1.740	1.847	1.863
1227	2367 1	1.536	1.540	1.511	1272	1114	1.604	1.611	1.734	1317	5418	1.524	1.807	1.873
1228	1035	1.532	1.541	1.510	1273	3732		1.615		1318	1112	1.508	1.870	1.907
1229	4391*	1.517	1.542	1.555	1274	241	1.495	1.615	1.650	1319	3060	1.535	1.873	1.893
1230	2372		1.543		1275	1415	1.578	1.620	1.627	1320	1364	1.51	> 1.95	1.505
1231	1037	1.517	1.544	1.546	1276	3196	1.495	1.625	1.807					
1232	4318 1		1.545		1277	2302	1.580	1.645	1.645					
1233	303	1.4386	1.5457	1.5942	1278	5411	1.610	1.625	1.675					
1234	61 1	1.507	1.546	1.546	1279	5562	1.620	1.625	1.630					

MISCELLANEOUS

1321	5135 1		1.524 (red)	1326	5221	1.49	1.58	1331	5541	1.625		1.690
1322	5244 1	1.529	1.533 (red)	1327	1069 1	1.495	1.565	1332	5424	1.552		1.768
1323	835 1		1.564 (red)	1328	610	1.579	1.600	1333	Bolland, 57, 31: 390, 10, approximate data only			
1324	868	1.385		1329	4500	1.583	1.747					
1325	3873*	1.480		1330	2135	1.602	1.627					

*Hydrated form

†Metastable modification

‡Stable modification

INDEX TO C TABLE

Abietic acid, 5477	Acetic anhydride, 628	Acetophenoneoxime, 2650	3-Acetylaminio-4-hydroxytoluene, 3203
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<i>p</i> -Acetaminophenol, 3716	Acetone diethylalufone, 2416	Acetylaminobenzoic acid, 3110	Acetylenedicarboxylic acid, 549
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1155.1, 1565, 1902, 4293, 5071, 5208, 5903. **118:** 32132, 261, 1183, 1195, 1214, 1224, 1309, 1383, 1830, 2090, 2187, 2613, 2930, 3211, 3629, 3794, 4112, 5123. **119:** 21, 1213, 1718, 1788, 3136, 3718, 4469, 4570, 5099, 5126, 5350, 31083, 188, 3884, 571, 1158, **120:** 3166, 3179, 3274, 3566, 3709, 3820, 3905, 3992, 31135, 31715, 32117, 32440, 32504, 32956, 33108, 245, 352, 1125, 1194, 1221, 1265, 1292, 1488, 1930, 2027, 2511, 2527, 2597, 2679, 2746, 3024, 3419, 3447, 3534, 3581, 4110, 4955, 5237, 5252, 5325.1, 5106, 5589, 5665, 5714, 3379. **121:** 33029, 178, 363, 1130, 1192, 1749, 2307, 2530, 3007, 4762, 4783, 4839, 4900, 5074, 5111, 5454, 5571, 1827, 2007, 3922, 1197. **122:** 313.1, 1174.1, 1824, 1877, 2236, 2458, 3503, 3508, 4459, 4818, 5116, 5554, 5980, 8, 2502. **123:** 3242, 3979, 81, 947.1, 954, 1122, 1447, 1487, 1833, 1997, 3169, 3313, 3404, 3461, 5461, 5466, 3251, 4245. **124:** 32025, 330, 592, 1686, 1878, 2566, 1504.1, 3429, 3618, 4192, 4361, 4477, 4708, 4739, 5062.1, 5465, 5829, 5869, 5947. **126:** 3172, 3656, 3705, 3746, 3904.2, 33048, 836, 1311, 1502, 2077, 2170, 2535, 2593, 2731, 3166, 3429.1, 3448, 3510, 3536, 3782, 4123, 4128, 4749, 5117, 5598, 5804.1, 5841, 6096, 6136, 5613, **128:** 3531, 521, 697.1, 808, 1348, 1672, 1689, 2877, 3139, 4063, 4274, 4461, 4805, 5144, 5728, 5930, 1279, 861, 3465, 5281. **127:** 3152, 3706, 31658, 32116, 1203, 1222, 1358, 1999, 2224, 2661, 2750, 2916.1, 3217, 3504, 3585, 3938, 4135, 4539, 4677, 4796, 4799, 5128.1, 5497, 5505, 1190, 2141. **128:** 31665, 291, 463, 1108, 1710, 2211, 2416, 2693, 3463, 3485, 3839, 3881, 4009, 4355, 4681, 5712, 4286. **129:** 32606, 636, 761, 872, 1387, 1783, 2003, 2220, 2601, 2674, 3059, 3167, 3431, 3437, 3934, 4249, 4301, 4420, 4744, 4806, 4961, 5096, 5340, 5621, 1260, 5204, 4216. **130:** 324, 3178, 3848, 31181, 32303, 32676, 104, 634, 1607, 1826, 1842, 1910, 1933, 1972, 2070, 2072, 2109, 2839, 3045, 3374, 4021, 4695, 5070, 5101, 6035, 6063, 574, 680, 2566.1, 3095, 2431. **131:** 1038, 1244, 2000, 2493.1, 3026, 3397, 3602, 4289, 4755, 5102, 5415, 5794, 5864, 6051, 2699, 3459. **132:** 3140, 3646, 31255, 906, 1682, 2176.1, 2324, 2563, 3030, 3058, 3140, 3424, 3838, 4369, 5534, 5741, 5886, 4923, 4936, 55. **133:** 3369, 326, 867, 975.1, 1226, 1681, 1683, 2612, 2673, 3012, 3072, 3075, 3256, 3496, 4234, 4334, 4468, 4623, 4728, 4811, 5157, 3087, 5551. **134:** 899, 1180, 1278, 1354, 1419, 1504, 2860, 3073, 4454, 4699, 5515, 5539, 5908, 6126, 1498, 1825, 1952, 4651. **135:** 3986, 630, 904, 1070.2, 1461, 1462, 2180, 2215, 2371, 3027, 3420, 3449, 3528, 3716, 4485, 4497, 5275, 5456, 5612, 5615, 360. **136:** 862, 1144, 1400, 1891, 2999, 3282.2, 4052, 4687, 4826, 5188, 5225, 5527, 5700, 5723, 5890, 5934, 5388, 5105. **137:** 1058, 1344, 1360, 1669, 2600, 2730, 3014, 3031, 3161, 3501, 3797, 4313, 4335, 4925, 5098, 5403, 5445, 6094, 1925, 2228. **138:** 454, 1137, 1361, 1711, 2146, 2652, 3442, 3513, 4704, 5952, 5997, 6025, 5995. **139:** 1071, 1823, 3176, 4781, 4808, 4904, 5596, 5746, 1481. **140:** 3583, 3728, 3907, 3987, 31074, 31106, 31136, 31396, 33201, 638, 1147, 2078, 2264, 2536, 2845, 2875, 3380, 3515, 3616, 4358, 4920, 5058, 5078, 5417, 5597, 5935, 5996, 6005, 1420, 5130, 5774, 1860. **141:** 138, 551, 572, 1355, 1951, 2024, 2025, 3178, 3377, 3672, 3711, 4054, 4367.3, 4568, 4952, 5088, 5095, 5114, 1898, 3102. **142:** 3539, 3803, 31254, 32988, 98, 1563, 3032, 3344, 3719, 4015, 4426, 4479, 5288, 5339, 5558, 6020, 5027, 1982. **143:** 3931, 31142, 31451, 31868, 1401, 2268, 2680, 3373, 3502, 3505, 3771, 4229, 4276, 4654, 4675, 4748, 4959, 3496, 5309, 1818, 3444. **144:** 3471, 3981, 31864, 781, 1274, 1673, 1676, 1907, 2520, 2541, 3113, 3138, 3696, 3887, 4462, 4766, 5319, 5479, 5873, 2214, 2689. **145:** 336, 889, 1238, 1668, 2074, 2088, 2876, 3408, 3436, 3492, 3841, 4422, 4811, 5069, 5118, 5414, 5548, 6075. **146:** 3269, 308.1, 869, 1677, 2948, 3275, 3281, 4200, 4644, 5697, 5708, 14, 1979, 4472, 3170. **147:** 32135, 1223, 1799, 1831, 2135, 2565, 2626, 3490, 4133, 4817, 5399, 5541, 5595, 5868, 1897, 2692, 5628. **148:** 633, 1145, 1280, 1398, 1406, 1845, 2602, 3187, 3500, 3831, 4518, 4548, 4692, 4732, 4865, 5112, 5427, 5933, 873. **149:** 31536, 2517, 2656, 4259, 4605, 4942, 5104, 5634, 6069, 6074, 3674, 57. **150:** 3159, 3161, 3454,

3540, 3541, 3885, 3965, 31090, 31183, 31625, 31942, 31961,
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 3624, 3886.1, 4074, 4382, 4538, 4738, 4784, 5026, 5076, 5990,
 6031, 6078, 2556. **151:** 3137, 1562, 2734, 3426, 4141. **152:**
 3247, 70, 219, 575, 1451, 1524, 1846, 2138, 2308.1, 3475, 3559,
 3675, 3888, 4199, 4227, 4486, 4607, 4671, 4819, 5145, 5239, 5899,
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156: 853, 1189, 1452, 1938, 2749, 3117, 3440, 3479, 4146, 4189,
 4237, 4446, 4494, 4564, 4565, 4934, 5473, 5512, 5655, 5831, 5973,
 6017, 2226, 3876. **157:** 3912, 884, 1061, 1310, 1384, 3086, 3282,
 3840, 4057, 5139, 5187, 5217, 5525, 5971, 5990. **158:** 362, 1435,
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 577, 819, 1363, 2013, 2654, 3104, 3516, 4142, 4367.1, 4811, 5081,
 5650, 5909, 296, 1032. **160:** 3885, 31080, 31127, 31132, 31395,
 31612, 31947, 33302, 36, 309, 637, 1508, 1780, 3025, 3068, 3111,
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 4562, 4867, 5568, 5575, 5906, 5950, 5960, 5977, 6000, 6088, 5103,
 2691, 3379, 5491. **161:** 61.1, 308, 777, 900, 1129, 1424, 1460,
 1579, 2209, 2265, 2321, 2370, 2428, 2790, 4071, 4214, 4354, 4456,
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 4610, 4678, 4745, 4995, 5238, 5421, 5726, 2675, 5404. **163:** 82,
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 4656, 4751, 5251, 6068, 5100. **164:** 868, 1240, 1528, 2010, 2141,
 3177, 3487, 4037, 4185.1, 4747, 4773, 5086, 5186, 5213, 5514,
 5874, 6084, 1816, 3480, 1034, 5573, 5613. **165:** 381, 3735,
 3926, 353, 434, 1141, 1361, 1404, 1425, 1717, 1849, 1998, 2260,
 2540, 2621, 3142, 3288, 3560, 3885, 4164, 4240, 4303, 4714, 4803,
 5240, 5428, 5867, 5932, 6021, 5796. **166:** 1505, 1815, 3148, 3632,
 4365, 5212, 5927, 1751. **167:** 3292, 33146, 1913, 2019,
 2106, 2193, 2603, 4481, 5498, 5542, 5577, 32980, 1864, 4716,
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 2828, 3093, 3486, 4496, 5329, 5561, 1143. **169:** 3774, 1290,
 1605, 1797, 1914, 2188, 2549, 3605, 3609, 4028, 4474, 5081, 5144,
 5540, 6127. **170:** 3175, 3248, 3288, 3359, 3929, 31079, 31220,
 31610, 436, 639, 776, 1200, 1239, 1446, 1486, 1977, 2167, 3141,
 3521, 3533, 3612, 3954, 4646, 4653, 4667, 4767, 4943, 5171, 5172,
 5196, 5330, 5659, 5790, 5818, 6022, 6042, 1416, 2079. **171:** 297,
 438, 523, 1583, 2489, 2755, 3488, 3647, 4188, 4255, 4574, 4872,
 5352, 5651, 5718, 5798, 6032, 1256. **172:** 2235, 2609, 4230, 4809,
 5469, 5648, 5652, 5668, 1273, 5508, 5578, 2604, 3226, 2541. **173:**
 76, 3232, 4143, 4190, 4291, 6030, 33011, 5271. **174:** 31219,
 1394, 1671, 1776, 1840, 2075, 2213, 3707, 3815, 4127, 4182, 4198,
 5180, 5207, 5298. **175:** 3888, 3678, 31198, 31209, 31313,
 31618, 501, 903, 2210, 2266, 2378, 2476, 3206, 3409, 3527, 3625,
 3830, 4356, 4368.9, 4369.1, 4534, 4546, 4820, 4829, 4873, 5082.2,
 5489, 5511, 5562, 5657, 5701, 5747, 5797. **176:** 650, 2369, 3106,
 3376, 3511, 3842, 5242, 5267, 5744, 5912, 1981, 2587. **177:**
 31346, 1836, 2659, 2752, 5572, 5777, 5291, 6139, 2611. **178:**
 3164, 200, 1124, 1148, 1285, 1577, 1911, 2605, 3511, 3541, 3832,
 4027, 4265, 5269, 5278, 5535, 5547, 5645, 5711, 5783, 5785, 6104,
 1953, 5724. **179:** 549, 567, 1835, 2660, 3846, 4656.1, 4877, 4910,
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 3950, 31126, 31166, 31195, 31554, 33143, 33288, 703, 1196,
 2260.1, 2422.2, 2512, 3023, 3378, 3386, 3896, 4215, 4717, 5314,
 5549, 5658, 5660, 5666, 5945, 6076. **181:** 1188, 2433, 2185, 2599,
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 3837, 4878, 5042, 5090, 5530, 5649, 5946, 5949, 6131. **183:** 71,
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184: 3849, 679.1, 767, 1182, 1448, 2546, 2794, 4556, 4929, 5803,

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 3108, 4030, 4134, 4825, 5107, 5137, 5463, 5559, 5631, 5998, 6002,
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 3626, 3644, 4396, 5889, 6050, 6122, 1975, 5175. **187:** 94, 840,
 1781, 2076, 2270, 2374, 3869, 4428, 4711, 5109, 5228, 5925, 6018,
 6085, 3111, 3483, 4598, 5742, 5493. **188:** 3023, 31201, 1120,
 1281, 1359, 1750, 2186, 2417, 4111, 4198, 4911, 5232, 5591, 5778,
 5781, 6119, 1820, 299. **189:** 147, 8049, 3064, 3526, 3698, 4424,
 4501, 5046, 5331, 5428, 5467, 5516, 5564, 5788, 5793, 5898, 3407,
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 33206, 33209, 818, 1121, 1624, 1789, 1900, 1940, 2435, 2459,
 2989, 3020, 3518, 4056, 4078, 4217, 4277, 4423, 4541, 5136, 5495,
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 3084, 3645, 3871, 4073, 4593, 4631, 1722, 5125, 877. **192:** 38850,
 707, 2630, 5234, 5299, 5792, 5931, 6138, 5106. **193:** 3930, 261,
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 5303, 5435, 6038, 5563. **194:** 31649, 31707, 31805, 1779,
 2373.1, 3375, 3476, 4430, 4650, 4679, 1821, 5226, 5337, 5413, 6070,
195: 31180, 31555, 33231, 709, 876, 2917, 3088, 3162, 3384,
 3445, 4357, 4121, 4526, 4535, 4633, 5050, 5113, 5276, 5626, 5844,
 5929, 5957, 6003, 6049, 6067, 6135, 33298. **196:** 1780, 3873,
 1221, 5189, 1136, 31137, 31253, 535, 2287, 2528, 3051, 4463,
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 3686, 31194, 31218, 2020, 2376, 4059, 4601, 5419, 5424, 5624,
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 3039, 3067, 4367.5, 4669, 4694, 4706, 4937, 5312, 5458, 5476,
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 31196, 1775, 1834, 2438, 2554, 3040, 5326, 5614, 2014, 1983,
 4547, 4394. **202:** 901, 1402, 1837, 2465, 3868, 4044, 5211, 5425,
 5447, 6141. **203:** 1787, 2260.2, 2631, 2655, 3046, 3385, 4810,
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 4612, 4905, 5127, 5433, 5496, 6098, 1819, 6073, 4948. **205:**
 3169, 3772, 31125, 33211, 33290, 599, 1839, 3554, 3635, 3866,
 4231, 4368.1, 4487, 4719, 4938, 5036, 5270, 5274, 5328, 5504,
 5821, 5884, 6039. **206:** 3716, 32937, 640, 676, 1405, 1584, 2017,
 3085, 4191, 4489, 4871, 4936.1, 5294, 5296, 5586, 5727, 5737, 5838,
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 5048, 5305, 3996, 5529, 5892, 33293, 1722, 5443. **208:** 31188,
 440, 977, 2608, 3083, 4611, 4680, 5091, 5214, 5327, 5733, 5786,
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 32707, 32948, 33303, 174, 486, 704, 1337, 2323, 3094, 3828,
 4083, 4145, 4397, 4464, 4471, 5197, 5286, 5351, 5434, 5441, 5446,
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 2945, 3033, 4604, 5082.1, 6034, 6102. **212:** 3085, 31217, 33232,
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 5743, 6099, 6159. **213:** 31208, 33213, 33326, 1866, 2015, 2733,
 2947, 3556, 3964, 4295, 5509, 5707, 5909. **214:** 3889, 31189,
 31624, 1801, 2274, 2437, 2557, 5316, 5809, 2243, 5641. **215:**
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 2806, 3673, 4232, 5680, 5871, 6023, 6079, 6153, 39490. **216:**
 3021, 3438, 3517, 3910, 4114, 4663, 4684, 5683, 5699, 5775, 5970,
217: 32529, 33301, 435, 831, 854, 1062, 2436, 2798, 2946, 4254,
 4881, 5132, 5629, 6037, 6087, 6163, 1976. **218:** 3320, 31105,
 31186, 3047, 3405, 4444, 4649, 4879, 5209, 5452, 5503, 5590,
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220: 3153, 3968, 31028, 31205, 31213, 31215, 32726, 364,
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 4170, 4606, 4673, 4718, 4775, 4864, 4957, 5082.3, 6142. **221:**
 3959, 31803, 2732, 3773, 4316, 4617, 5544, 5883, 31490, 1126,
 2429, 4252, 5191, 5290, 5979. **223:** 1070.1, 5040, 5080, 6032.1,
 32686, 554, 1680, 2273, 3041. **225:** 3317, 3928, 33210, 33214,
 1114, 3202, 4081, 4530, 4691, 4840, 4944.1, 5181, 5398, 5487,
 5684, 5888, 3516. **226:** 3517, 74, 708, 1110, 1903, 3097, 3432,
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4483, 5192, 5780, 5638. **228:** 21190, 21212, 1896, 1909, 2244, 2482, 2666.2, 3234, 3610, 4083, 5182, 5297, 5439, 5926, 6052, 6148, 1474, 1493, 4876, 6083. **230:** 2165, 2299, 2316, 2895, 21060, 23296, 527, 878, 1800, 1828, 1912, 2430, 2754, 3443, 3853, 4613, 4890, 5462, 5468, 5654, 5685, 5736, 5791, 6092. **231:** 59, 3555, 4768, 5062, 21680, 1139, 1140, 1345, 4599, 5636, 5661, 5910, 5956. **233:** 2424, 241, 1492, 4016, 4194, 5056, 5703, 5713, 1670, 3552, 3557, 4312, 4945, 5911, 5986. **235:** 21211, 22502, 22763, 23299, 260, 610, 1076, 1598, 1782, 1908, 2449, 3270, 3444, 4085, 4500, 5089, 5333, 6001, 6053, 6124. **236:** 21214, 22608, 4657, 5552, 5599, 5907, 2804, 2891, 21200, 1075, 1902, 2701, 3451, 3743, 4224, 4499, 4660, 4712, 5293, 5716, 2254, 5041. **238:** 2758, 1338, 2107, 2439, 3043, 3150, 4154, 4524, 4696, 4812, 4910, 5094, 6168, 2245, 2186, 4256, 5227, 5663. **240:** 21633, 21804, 830, 1399, 1578, 3050, 3066, 3204, 3723, 4129, 4608, 4664, 4666, 5033, 5272, 5455, 5776, 5914, 5982, 5983. **241:** 3274, 3613, 4035, 4294, 5416, 5900, 1862, 22984, 494, 5451, 5600, 5669, 6115, 1899, 706, 1514, 4084, 5190. **244:** 2183, 4616, 5259, 6077, 4211, 2184, 21187, 565, 2443, 3185, 5471, 5632, 5804, 5896. **246:** 493, 705, 3298, 3636, 4022, 5060, 2187, 1679, 3106, 5203, 5343, 5822. **248:** 21674, 22674, 23297, 904.3, 1901, 3572, 5670, 6143, 3182. **250:** 2380, 2884, 2916.1, 21130, 21202, 21207, 21210, 21711, 23059, 23102, 541, 2122, 2446, 2177, 2627, 3109, 3965, 4040, 4181, 4509, 4715, 4880, 4946, 5051, 5075, 5206, 5677, 5679, 5701, 5820, 6040, 6062, 5650. **251:** 22134, 1539, 1847, 4571, 5264, 21073, 22689, 21199, 22935, 3110, 3720, 4364, 4683, 4693, 5709, 6006. **253:** 22754, 1093, 1374, 1529, 5047, 5964, 2173, 21129, 1146, 1771, 3178, 6089, 6158. **255:** 22021, 557, 1408, 2422.1, 2444, 4618, 4926, 6161, 21872, 21203, 517, 995, 1523, 2658, 3018, 4527, 4638, 4642, 4737, 4931. **257:** 2120, 2792, 3292, 4502, 5807, 6117, 609.1, 1625, 1904, 3512, 4124, 5045, 5277. **259:** 2993, 2898, 21204, 1020, 3381, 5567, 2891, 21486, 23311, 682, 1575, 3940, 4315, 4822, 4869, 5300, 5323, 5338, 5702, 5843, 5895, 6172. **261:** 2451, 5400, 5504, 5696, 4167, 4634, 4933, 5972, 3462, 3862, 5324, 5488, 5506, 5442. **265:** 21896, 875, 2552, 3209, 5322, 5517, 5913, 21193, 1883, 2791, 4602, 4690, 4909. **266:** 4251, 4963, 5642, 6037, 3280, 3434. **270:** 2722, 2900.1, 2982, 21173, 22761, 679, 2445, 2817, 3019, 3382, 3796, 4197, 4674, 5401, 5518. **271:** 22704, 4949, 5513, 2151, 4246, 4629, 5295, 5911, 6154, 23282. **273:** 21475, 1068, 2521, 4884, 5513, 5537, 5860. **275:** 21675, 21729, 22687, 532, 1708, 3480, 4025, 4874, 4882, 5032, 5556, 5619, 6155. **276:** 2224, 21678, 2883, 21679, 21191, 3691, 4314, 6097, 2690. **280:** 2391, 2642, 2828, 21880, 22532, 22906, 21193, 1380, 1707, 2102, 2108, 3721, 4030, 4628, 4870, 5307. **282:** 21342, 1603, 6036, 3208, 3484, 22115, 4488. **285:** 766, 1521, 2620, 4602, 4862, 4888, 5585, 5863, 5936. **286:** 1471.1, 1191, 3052, 4182, 5448, 5464, 23319, 573, 22071, 1455, 1194, 1773, 2188, 4861, 4060, 4615, 21128. **290:** 2223, 2228, 2890, 2954, 22590, 1109, 1706, 2158, 3090, 3294.1, 4626, 4689, 5672, 5748, 5811, 6055, 1059. **292:** 2283, 22983, 3481, 4630, 1113, 2793, 1860, 485, 552, 780, 1705, 2823, 3053, 3222, 3848. **297:** 22958, 5318, 2225, 1069, 1980, 5806, 2152. **300:** 225, 2229, 2272, 2549, 2550, 2691, 2794, 2823, 21056, 21749, 21915, 22682, 22706, 23194, 23195, 1106, 1407, 2442, 4887, 5023, 5502, 5550, 5686, 5721, 5834, 5943, 5981. **302:** 2882, 4624, 4643, 5061, 21879, 1289, 4863, 1107, 1475, 2487, 5882, 2271, 5976, 21993, 22705, 5817. **310:** 2227, 21818, 23221, 1385, 4185, 4253, 4635, 4889, 5975, 22952, 4886. **315:** 2617, 23309, 1069.1, 6133, 6161, 1346, 4891, 22688. **320:** 2315, 2495, 21111, 22815, 1127, 2702, 3586, 4665, 4885, 5030. **321:** 21474, 22170, 1905, 2447, 22756, 21746, 6060. **330:** 2480, 4594, 4595, 4627, 4636, 5022, 5029, 5722, 5082, 2715, 888, 2153, 2711, 22960, 564. **340:** 266, 2710, 2889, 2157, 2703, 4661, 4686, 5024, 5031. **350:** 2561, 2844, 21245, 22790, 23106, 1112, 3022, 5819, 2684, 4438, 23359, 2182, 23051. **360:** 21859, 4883, 5695, 2749, 879,

21836, 22922, 22925, 1411, 2543. **380:** 292, 22917, 2704, 22679, 21785, 2832, 22623, 2155, 22811, 5028, 2752, 23101. **400:** 2657, 22923, 22939, 22959, 23015, 23190, 23279, 1409, 2156, 2548, 22446, 2154, 2713, 22503, 23310, 23310, 199, 420: 23289, 2939, 23238, 21777, 2696, 23202, 21062, 21837, 2742, 21058, 2322, 2703, 22103, 23022, 23237, 21075, 22685, 2753, 22615, 2704. **450:** 282, 22602, 21779, 2867, 21059, 22947, 2700, 23300, 22744, 2562, 22933, 21140, 21835, 21036. **480:** 21757, 21086, 22675, 21061, 22104, 2948, 2940. **500:** 294, 2529, 2616, 21244, 21710, 23130, 2699, 22505, 22105, 2174, 23175, 2535, 23300, 22610. **550:** 2296, 2859, 22788, 21064, 23117, 22928, 22257, 22836, 22773, 2193, 21778, 2825, 2880, 22458, 2328. **575:** 22244, 21163, 22929, 2829, 21088, 22077, 23303, 22531, 23168. **600:** 2861, 23280, 2542, 23006, 2302, 2951, 22973, 2301, 22821, 22605, 22711, 22634, 23292. **625:** 2326, 22063, 2304, 21984, 2707, 23287, 23273, 23167, 23205, 22442, 2881, 23284. **650:** 21268, 21963, 22680, 21068, 22841, 21270, 22911. **675:** 22233, 22496, 22080, 22601, 22831, 23200, 22833, 2324, 22039, 21017, 22820, 2536, 22824. **700:** 21275, 22136, 22822, 22832, 22829, 2327, 22131, 22162, 23197, 2665, 22908, 21773. **725:** 22599, 22924, 22238, 2757, 22513, 22909, 22847, 2664. **750:** 22907, 23158, 22677, 23172, 2692, 21154, 23196, 22239, 2663, 22921, 21873, 2788, 22236, 21153, 22926. **775:** 21042, 22748, 2503, 22849, 22024, 23161, 21543, 21775, 21642, 21541. **800:** 2567, 2810, 21247, 21440, 21744, 22837, 23171, 2576, 22671, 22905, 22974, 22893, 22008, 2307, 2669, 23349, 2568. **825:** 21066, 21004, 21018, 22628, 23224, 22654, 21631, 22509, 21979, 21087, 21772. **850:** 21041, 2528, 21265, 22745, 2309, 2572, 22616, 2501, 2579, 22584, 22838, 22604, 2747, 23131, 22438, 22777. **875:** 21838, 21839, 21243, 2499, 21070, 22918, 22692, 2524, 22975. **900:** 2780, 2857, 22253, 22656, 21959, 2937, 2560, 23115, 23116, 22487, 21939, 2571, 23129. **950:** 21246, 21669, 21774, 21072, 22161, 22441, 22500, 22846, 21564, 22002.1, 22262, 23100, 23013, 2557, 22670, 23017, 2570, 23267, 22716, 21385, 21567. **1000:** 2836, 22598, 22852, 22588, 22507, 23305, 2559, 2789, 21384, 22645, 23132, 21862, 2843, 23014, 2577. **1050:** 22863, 22587, 23215, 2558, 22938, 21668, 22776, 22003, 22967. **1100:** 2824, 2956, 21223, 21593, 21870, 22360, 22379, 22486, 22865, 22174, 21374, 21561, 2970, 2552, 21694, 2957, 22488, 2587, 22334. **1150:** 23138, 2573, 21571, 21851, 2553, 21572, 23139, 22035.1, 21976.1, 21651, 22141, 22437, 21348. **1200:** 22313, 22644, 22354, 21850, 22263, 2765, 2876, 2877, 23283, 21407, 22646, 22275, 21317, 21518, 21314, 22499, 21372. **1300:** 21319, 22380, 21519, 21581, 22589, 21316, 22597, 21318, 21978, 21520, 21845, 22712, 22966, 2947, 21957.1. **1351:** 21846, 22235, 22431, 22663, 22659, 22427, 21517, 22130. **1400:** 22660, 21325, 22125, 21333, 22559, 22355, 2811, 22248, 22561, 22394, 21424, 22430, 21801, 21671, 22323, 22426. **1500:** 2858, 2812, 21795, 22860, 22274, 22392, 21337, 22270, 22315, 21406, 22404, 22400, 22175, 21334, 22451, 22472, 22521, 22538, 22410. **1600:** 22391, 22557, 22267, 22273, 2447, 21258, 22850, 21621, 2343, 22266, 22537. **1700:** 22600, 2340, 22393, 22544, 22328. **1800:** 21904, 21393, 2755, 21619, 22177. **1900:** 21590, 22494, 21743, 21977, 21763, 21858, 22318, 22222, 21877. **2200:** 22109, 21724, 22283, 21821, 21663. **2400:** 21725, 22100, 21945, 22434, 21662, 2483, 22232. **2700:** 2473, 21689, 21767, 22099, 22128, 2456, 21690. **3000:** 2461.

II. BOILING POINTS

—192: 2337, 54, 295, 2345, 180, 21813. —95: 2204, 2465, 297, 252, 2195, 29, 115, 2351, 44. —75: 2205, 217, 2350,

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1875, 3785. 241: 2125, 2544.1, 2738, 3251, 4368.8, 2052, 1217,	4728, 5168, 5335. 345: 2212, 5038, 4434, 31675, 4672, 4902,
1576, 1955, 2243, 2578, 3174, 3790, 4374, 3098, 4337. 243:	5521. 350: 4515, 5183, 5184, 5747, 4427, 4435, 4436, 3898,
1432, 1790, 2124, 2176, 2163, 2522, 2822, 2863, 3036, 3589, 4038,	4285, 4211, 4465, 5520, 5402. 360: 1991, 3042, 3307, 4137, 4622,

4676, 4912, 4913, 5193, 5491, 5746, 5816, 4287, 4892, 5281, 4012.
371: 4215, 3471, 4514, 5053, 4249, 4620, 6010, 31869, 5379,
 5887, 3882, 4907, 5173, 5306, 5055. **400:** 3958, 31798, 32959,
 4690, 3292, 4286, 5395, 3226, 32608, 389, 3480, 5494. **421:**
 392, 5883, 5274, 3716, 4626, 5863, 4722, 31075, 5172, 3316,
 5264. **452:** 5493, 3320, 4637, 4636, 5508, 31749, 3170, 3223.
500: 3322, 3769, 5817, 3224, 3228, 5695, 3227, 3678, 3271,
 32105. **600:** 3193, 31879, 3400, 3487, 3753, 3752, 3881.
707: 3272, 3832, 3495, 3749, 3696, 3700, 3703, 32936. **916:**
 3543, 3548, 3529, 3829, 3825, 3940, 3779, 31268, 32613.
1230: 3499, 33283, 32610, 3528, 3951, 33284, 32680, 33205,
 33287, 32917, 32926, 33200, 3947, 32605, 3939, 32924,
 32668, 32677, 33197. **1400:** 32499, 33196, 32131, 32671,
 32921, 32769, 32918, 31337, 31059, 31870, 31334, 32500.
1670: 32604, 32670, 31858, 3311. **3800:** 31619, 31721,
 31799, 3481, 31805, 31889, 31690.

III. DENSITY

A. Liquids

0.415: 54, 409, 3102, 1072, 1073, 3408, 1716, 1715, 980, 1713,
 1714. **0.670:** 2392, 2394, 915, 916, 2387, 1610, 3407, 2389, 917,
 2391, 1534. **0.692:** 1613, 2933, 525, 823, 918, 1617, 22, 3410,
 914, 2939, 824. **0.712:** 1619, 3409, 3414, 822, 1535, 2331, 3354,
 524, 2334, 2936, 1761, 2940, 3995. **0.724:** 2873, 3425, 1764,
 2279, 3412, 1086, 4000, 3994, 794.1, 3999, 821, 794, 1760. **0.740:**
 820, 3415, 3351, 4178, 396, 3416, 2985, 1741, 3993, 3957, 1101.
0.750: 1615, 1100, 1738, 1737, 979, 1739, 2975, 4412, 3372, 4587.
0.760: 669, 4586, 479, 2974, 4165, 2211, 2328, 2330, 2413, 1001,
 4856, 3418, 1099, 1762.1, 3323, 4012, 4411, 2869, 2973. **0.771:**
 2868, 2987, 5018, 3365, 3420, 4006, 4849, 5167, 913, 1632, 2419,
 4418, 5260, 3421, 1612, 2867. **0.781:** 3422, 208, 3423, 168,
 395, 506, 3320, 1049, 262, 792, 5156. **0.790:** 3960, 3297, 5377,
 60, 1003, 3961, 301, 667, 718, 448, 2825, 2284, 3812. **0.800:** 790,
 1769, 2281, 972, 1603, 2827, 973, 3811, 1639, 3295, 505, 3411,
 2382. **0.805:** 719, 880, 1366, 1544, 2283, 2345, 447, 791, 2955,
 1081, 1084, 1602, 2282. **0.810:** 789, 1537, 1084.1, 1630, 2327,
 2898, 2665, 1754, 3895, 3959, 1640, 1730.1, 2320, 2347, 313, 1003,
 2396, 2397, 2872. **0.817:** 717, 1078, 2403, 2897, 2960, 1005,
 1085.1, 1636, 1699, 2896, 1085, 1726, 1733.1, 2407, 2407.1, 2408,
 2968. **0.820:** 1728, 2399, 5169, 2892, 2970, 3827, 2967, 1725,
 2400.1, 2409, 2796, 2954, 2962, 3356, 1727, 1734, 3978.1. **0.825:**
 2971, 3978, 4005, 4170, 4172, 4848, 800, 2240, 2963, 2966, 2956,
 3364, 1736, 2400, 3361, 4002. **0.830:** 1469, 2797, 3826, 1547,
 1732, 1746, 2929, 4415, 237, 587, 3362, 925, 2410, 3326, 4179,
 4836, 998, 1633, 3355, 3821. **0.835:** 1098, 1629, 2239, 810, 811,
 3358, 517, 814, 837, 999, 1628, 1000, 2952, 3889, 2865, 3893.
0.840: 273, 749, 2412, 3808, 3822, 356, 1466, 3810, 3809, 3815,
 4010, 2928, 1546, 1468, 1470, 272. **0.850:** 2343, 1572, 3816,
 1063, 711, 993, 2890, 3333, 3334, 446, 1048, 3823, 3824. **0.856:**
 927, 3894, 3903, 5606, 1096, 2288, 3728.1, 1545, 3727, 5380, 3331,
 5978. **0.860:** 469, 1054, 2834, 3333.1, 3725, 3728, 3730, 3992,
 4415, 2686, 3734, 3805, 3969, 4168, 513, 3226, 3228, 3724, 4408,
 3229.1. **0.863:** 1548, 2835, 2912, 3820, 4367, 2909, 1, 3223, 2685,
 3731, 3806, 5853, 2359.1. **0.866:** 801, 2112, 2357, 2901.1, 3729,
 4475, 3225, 3726, 4365.1, 2354.1, 3229, 3740, 1, 3330.1, 3807,
 3899, 3988, 2359. **0.870:** 926, 1046, 1653, 4992, 5813, 2901, 748,
 1649, 1652, 1655, 1064, 1695, 2855, 2903, 3891, 798, 2355, 2683,
 747. **0.875:** 2354, 3915, 3230, 4576, 2356, 3987, 533, 2858, 3733,
 3817, 1654, 2353, 2684, 2953, 4117. **0.880:** 1365, 5003, 1658,
 3908, 3920, 1015, 1651, 3224, 4366, 1016, 1043, 1659, 3329, 4991.
0.884: 746, 4144, 4118, 4370, 1020, 3337, 4827, 1496, 2111, 3850,
 4828. **0.890:** 468, 1017, 1019, 3119, 1044, 3807, 4980, 1047, 3227,
 4376, 5001, 3303, 3918, 5141, 2415, 3917, 397, 1018, 3890, 5362,
 713, 725, 3974.1. **0.901:** 727, 3639, 3740, 3902, 4385, 4835, 5253,
 2538, 5152, 5346, 451, 4842, 4974, 2884, 3328, 4158, 5015, 3324,

4977, 1056, 4148. **0.910:** 670, 2899, 3961, 4368.8, 908, 2888,
 3913.1, 4841, 642, 2883, 2777, 3861, 1055, 2340, 4982, 5342, 5605.
0.915: 3429, 31824, 2831, 3786, 3813, 3013, 6166, 801, 2337,
 3788, 4156, 726, 3369, 2298, 4578, 4972, 1557, 3923, 3924, 4388.
0.920: 4131, 3854, 3928, 2351, 764, 2330, 2341, 3575, 938, 2290,
 3341, 5482. **0.925:** 1558, 1644, 2289, 3847, 3927, 4971, 452,
 937, 1647, 4130, 1643, 2882, 3258, 3926, 3935, 4975. **0.930:**
 2153, 2859, 4976, 4978, 3931, 671, 4843, 965, 2830, 3936, 3735,
 3764, 3789. **0.935:** 489, 799, 1519, 2861, 2201, 2810, 3922, 4157,
 1981, 569, 3260, 3787, 3859, 375, 4371, 3263, 4561. **0.94:** 2979,
 3790, 3882, 3883, 1010, 3259, 3947, 4990, 703, 1012, 2294, 3858,
 762, 978, 2386.1, 3860, 3852, 4560. **0.945:** 909, 3857, 997, 2818,
 589, 623, 3948, 721, 1541, 3214, 3267, 5005. **0.950:** 1443, 2199,
 2811, 3265, 783, 924, 1478, 1444, 3319, 3762, 3865, 3904, 4132,
 6326, 5940. **0.955:** 2775, 624, 1445, 2756, 4378, 752, 2335, 3765,
 723, 1555, 2200, 6167. **0.960:** 3753, 1554, 307, 2763, 3204, 2014,
 1553, 2722, 3121, 3655, 2778, 4089, 2365, 3246, 2840. **0.970:**
 1551, 2721, 3933, 3637, 355, 2762, 4823.1, 1505, 2758, 213, 625,
 2766, 3638, 4091.1. **0.975:** 929, 1511, 3752, 3856, 4967, 3432,
 2767, 3751.2, 5009, 3656, 1026, 2760. **0.980:** 1089, 2195, 1067.1,
 2719, 870, 3651.1, 1314, 2761, 3878, 930, 3661, 3763, 4579. **0.985:**
 4372, 4573, 2203, 3618, 935, 2718, 3662, 3761, 4941, 5000, 5688,
 1312. **0.990:** 934, 1482, 4161, 681, 3235.1, 400, 450, 2757, 102,
 815, 3664, 4315, 1090, 1500, 1662, 2163, 3235. **0.995:** 3311,
 103, 1070, 1519, 3236, 3573, 2204, 3243, 3574, 31, 2058, 4761.
1.000: 1095, 4097.1, 66, 3128, 4513, 5110, 5334, 258, 797, 896,
 3131, 3051, 4490, 4757, 4930, 3237, 773.1, 3747, 4147. **1.010:**
 594, 2743, 3132, 5110, 3197, 1560, 590, 2713.1, 620, 2503, 4098,
 3780, 4096, 1097, 1279, 652, 928, 2846, 2848, 2302, 2569. **1.020:**
 608.1, 795, 2570, 3701, 285, 608.2, 1442, 5371, 2322, 4904, 1328,
 1561, 3312, 4038, 1789. **1.026:** 2571, 3680, 4090.1, 619, 2567,
 3681.1, 3684, 5010, 3420, 651, 1022, 3133, 3679, 3703. **1.03:**
 3104, 1028, 3677, 3125, 3678, 218, 4939, 2161, 496, 2706, 3676,
 2568. **1.040:** 2255, 2745, 4515, 4970, 3440, 2847, 5678, 3285,
 266, 274, 2001, 2159, 720, 3154, 3286, 212, 3069, 4062. **1.050:**
 593, 3152, 3284, 358, 2812, 4350, 511, 4153, 2309, 4348, 2318,
 2748, 3192, 3872, 4093, 4383, 2189, 3149, 399. **1.061:** 2788,
 4296, 1029, 3283, 911, 4353, 610, 3135, 3191, 378, 576, 989, 1441,
 3601, 3547, 2813, 176, 1606, 458. **1.071:** 2041, 2040, 3548, 3549,
 1430, 2572, 5944, 807, 913, 969.1, 2310, 2590. **1.080:** 737, 1570,
 2039, 3667, 2588, 449, 626, 600, 3546, 968, 621, 2008, 4726, 1572.1.
1.090: 3649, 4102, 578, 1092, 1559, 2468, 2725, 420, 665, 2814,
 3037, 2589, 1889, 3591, 1357, 1483, 3642, 3036. **1.100:** 4723,
 3169.1, 4917, 471, 722, 2038, 154, 170, 1571, 4670, 247, 3688,
 4368.4, 561, 1307, 2087, 1417. **1.11:** 492, 2267, 2071, 657, 233,
 969, 4733, 264, 470, 4297.1, 672, 736, 2579, 2269. **1.121:** 1568,
 2134, 4064, 4324, 275, 2580, 5164, 520, 2509, 1341, 2669, 2849.1.
1.131: 3170, 805, 2578, 893, 4381, 3171, 46, 48, 383, 3945, 146,
 3253, 3886, 4023. **1.150:** 1756, 1388, 2127, 1390, 3439, 948,
 1917, 994, 2284.1, 3606, 658, 859. **1.160:** 2084, 3289, 3438,
 1253, 453, 2004, 460, 2499, 1252, 1092, 189, 949, 2606. **1.180:**
 3694, 887, 3798, 379, 2618, 5282, 655, 659, 2498, 1042, 3455, 334.
1.200: 1031, 2850, 1347, 1859, 227, 696, 1375, 858, 1041, 1376,
 279, 632, 710. **1.220:** 37, 384, 744, 1040, 2316, 3514, 1576, 4442,
 4441, 3435, 803, 1314, 1857, 863, 921.1, 1916. **1.252:** 190, 1856,
 515, 742, 67, 359, 2098, 741, 604, 3937, 1230, 3442, 1959, 1229.
1.310: 31575, 465, 192, 1327, 1506, 472, 473, 3441, 1251, 1250,
 604.1, 1540, 421, 1588, 158, 28, 1249, 2053. **1.340:** 3366, 464,
 423, 2639, 230, 365, 2637, 422, 2633, 1326, 342, 585, 963, 276,
 558, 582, 366. **1.400:** 497, 2491, 2423, 545, 2031, 605, 2030,
 2492, 2493, 364, 3634, 2029, 1697, 32, 159, 396, 3635, 220,
 31397. **1.460:** 311, 648, 5350, 1672, 225, 3453, 106, 310, 61,
 3636, 3352, 19, 329, 648.3, 1053, 1294, 2119. **1.500:** 1578.1,
 3632, 3637, 43, 1052, 1822, 107, 648.1, 137, 1051, 2454, 648.4,
 3629. **1.526:** 141, 3633, 467, 136, 1844, 1367, 3207, 645, 139,
 3630, 12, 756. **1.600:** 140, 367, 755, 754, 90, 1601, 3521, 3232,

558, 2494, 5129, 5512, 5628, 559, 757, 5210, 557, 5100, 221, 2061, 2062. 1.700: 368, 555, 476, 987, 694, 475, 562, 693, 513, 414, 5622, 690. **1.800:** 2064, 689, 1949, 688, 1759, 1333, 5523, 545, 390, 51597, 560, 38, 51808, 116, 5621. **1.901:** 5163, 600, 539, 412, 341, 234, 1205, 413, 5619, 83, 339, 340, 183, 5218, 5522. **2.110:** 415, 122, 184, 649, 186, 5188, 123, 5236, 45, 522, 370, 5378, 576, 5919, 4, 427. **2.529:** 601, 20, 151, 51815, 563, 5142, 345, 564, 101, 5, 127, 18, 235, 128. **3.022:** 5204, 5918, 5497, 5381, 29, 534, 5206, 87, 5205. **4.49.**

B. Solids

0.760: 846, 5881, 5918, 5967, 5985, 6011, 6080, 52916, 5244, 2266, 52601, 1502, 936, 4406, 6010. **0.919:** 52667, 548, 3016, 51812, 3257, 4805, 1058, 239, 3756, 181, 3302. **1.008:** 607, 5343.1, 3901, 52791, 761, 2573, 4322, 1057, 3307, 760, 2801, 5902, 482, 1077, 2206, 831. **1.051:** 2160, 5847, 5933, 1771, 3140, 289, 571, 52643, 3853, 3550, 502, 2116, 3494, 5244.1. **1.150:** 5213.1, 238, 4270, 2166, 3498, 4352, 832, 5131, 5430, 52623, 5887, 4943, 5404, 5284, 4894, 2595. **1.203:** 4225, 52626, 259, 5818, 3886.1, 52998, 504, 298, 3867.1, 5428.1, 55, 51896, 2701, 4480, 2308.1, 4226. **1.260:** 4167, 4956, 503, 5573, 1705, 52624, 5435, 2032, 5202, 52306, 1287, 1992, 308.1, 1581, 55, 5511, 5028.1, 1990, 1414. **1.35:** 6104, 4739, 5647, 5111, 5028, 4656.1, 802, 3697, 5173, 3111, 5704, 52655, 5522. **1.40:** 498, 2175, 58, 4622, 1929, 947, 5134, 52170, 52347, 1398, 6148, 1397, 5659, 52300, 4620, 2013, 1349, 53086, 3778. **1.45:** 52757, 808, 3178, 1419, 52171, 630, 52807, 1231, 52636, 976, 52119, 52693, 1351. **1.47:** 52990, 204, 1464, 1991, 2682.1, 52814, 1172, 1350, 51400, 51800, 5201, 52855. **5.0:** 5502, 51328, 51350, 51426, 51428, 51844, 51904, 5289, 51960, 51260, 51375, 52282, 51712, 52202, 51539, 5490. **5.10:** 5311, 51130, 52017, 5734, 51334, 5994, 52035.1, 53329, 51021, 52630, 52513, 5456, 5507, 5554, 51258, 51441, 53061, 5829. **5.2:** 5280, 51096, 51337, 51682, 51711, 51063, 51371, 51590, 51686, 52518, 51990, 51992, 52516, 5618, 5162. **5.3:** 5600, 5677, 5710, 5724, 51154, 51634, 5313, 5595, 51423, 5593, 51049, 51236, 51403, 51767, 5883, 51457, 5862, 5608, 5715, 5864, 5473, 51095. **5.50:** 5592, 51630, 51071, 51852, 51542, 51065, 5544, 5723, 5950, 51059, 5708. **5.6:** 5306, 5306.1, 51304, 51710, 51726,

5744, 5601, 5603, 5951, 5971, 51636, 51763, 51123, 5279, 5670, 51064, 51996, 51440, 51455. **5.7:** 5320, 5322, 51372, 51418, 51614, 52339, 5714, 52494, 5473.1, 51421, 5546, 52338, 51632, 51098, 51723, 5957, 5582, 52599. **5.8:** 5508, 5596, 51117, 51685, 51978, 51391, 52048, 5529, 5574, 52571, 52049, 51163, 5541. **5.9:** 5602, 51118, 51652, 51703, 5907, 51071, 5565, 52507, 5597, 52538, 51736, 51562. **6.0:** 5401, 5936, 51050, 51506, 51781, 51227, 5540, 52059, 5894, 52366, 51442, 51105. **6.1:** 5594, 51022, 51101, 51402, 51066, 51784, 5402, 5658, 5657, 5548, 51655, 5501, 5606, 52483, 51327. **6.2:** 5553, 5614, 51124, 51390, 51617, 5863, 5539, 51800, 5898, 51116, 5897, 51055. **6.3:** 5604, 5607, 51100, 51119, 51517, 51570, 51631, 51366, 52580, 51722, 5559, 51086. **6.4:** 5335, 5605, 5607, 5934, 5935, 5995, 51834, 51025, 5905, 5575, 5616, 5889, 5834, 5672, 51051, 51062, 5503, 5833, 5663, 51121. **6.5:** 5609, 5660, 51102, 51501, 51958, 51629, 53118, 5659, 55509, 5598. **6.6:** 5611, 5617, 51573, 52827, 51285, 5824, 51698, 5543, 5996, 51143, 51619. **6.7:** 51405, 52007, 52006, 5545, 5666, 51374, 51620, 51024, 5719, 51502. **6.8:** 5573, 5671, 5327, 5336, 5551, 5576, 5581, 51776, 52005, 5712, 51700, 51306. **6.9:** 5610, 5661, 51040, 51103, 51681, 51688, 51840, 52834, 5557, 5612, 51621, 5484, 51235. **7.0:** 5485, 5578, 5588, 5613, 5696, 51386, 51104, 51854, 5599, 52041, 51807, 5536, 5584. **7.1:** 5586, 5589, 51565, 5585, 5725, 53188, 5587, 5334, 5590, 5882, 51171, 51842, 5681, 51734, 52828. **7.2:** 51233, 51697, 5535, 52023, 51847, 5615, 52826, 52830, 5577, 51247, 51977, 5893, 51705, 51067, 51066, 5910, 5325. **7.4:** 51128, 51385, 51393, 51843, 51849, 52062, 52060, 52037, 51057, 51528. **7.5:** 5305, 5314, 5330, 5552, 5900, 51833, 51041, 5700, 5904, 5538, 51170, 51464, 5324. **7.7:** 5328, 5896, 5318, 5902, 52079, 51384, 51848, 51146, 5323, 5891, 5676. **8.0:** 5525, 5704, 51004, 51070, 51732, 51850, 5580, 5321, 5558, 5901, 5821, 5560, 5822. **8.2:** 5308, 51695, 5528, 51326, 5888, 5890, 51662, 51701, 51550, 5888, 51017, 5309, 51072, 51684, 51780. **8.64:** 52082, 5887, 5880, 5895, 51137, 51806, 51169, 5307, 51663, 5881, 5675. **9.04:** 51130, 5527, 5892, 52087, 5526, 5524, 52099, 5668, 5879, 51152, 51702, 51179, 51855, 51693. **11.1:** 5878, 51725, 51724, 51224, 51225, 51689, 51690. **16.06.**

LIQUID CRYSTALS

H. W. FOOTE

The term "transition temperature" refers in the tables to the temperature at which the solid and crystalline-liquid phases are in equilibrium at a pressure of one atmosphere; by "melting point," is meant the corresponding temperature at which the crystalline-liquid and isotropic liquid phases are in equilibrium. In some cases, more than one stable liquid crystal phase exists, giving an additional transition temperature for each additional liquid crystal phase. These transition temperatures between two liquid crystal phases are indicated by *. In most cases, they are only approximate. Melting points which are quite uncertain, usually due to partial decomposition, have "d" written after the value. No attempt has been made to estimate the accuracy of values obtained by a single investigator, as the methods of determination are the same in nearly every case and the result obviously depends on the skill of the investigator and the purity of the compounds.

A series of apparently good determinations by different observers is apt to vary by considerably more than one degree, and it seems unlikely that any transition temperature or melting point of liquid crystals is known with an accuracy much better than one degree.

For this reason, the weighted average of a number of different determinations is usually given to the nearest whole degree. When the number of determinations is sufficient, the weighted average deviation, usually to the nearest whole degree, is given also.

The melting points of unstable liquid crystals, in monotropic systems, are not included in the tables, and transition temperatures, in the ordinary sense, do not exist in this case. Many observations on monotropic compounds will be found in nearly all the Halle dissertations and in the publications by Vorländer, which are listed at the end of the tables.

For the effect of pressure on the transition temperature and melting point of liquid crystals, see G. Hulett, 7, 28: 629; 99. For approximate data on liquid crystals of alkali salts of higher fatty acids (chiefly) see Vorländer, 25, 43: 3120; 10. For similar data regarding compounds which are optically active, see H. Stoltzenberg, Diss., Halle (1911). For qualitative data regarding liquid crystals, see E. Wolferts, Diss., Halle (09), R. Wilke, Diss., Halle (09); K. Mattenklodt, Diss., Halle (11); and Vorländer, 26, 40: 1415, 1966; 07.

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{10}H_{10}O_2$	$CH_3OC_6H_4CH:CHCOOH$	<i>p</i> -Methoxycinnamic acid	170 ± 1	186 ± 1	(7, 11, 30, 32, 34, 43, 45)
$C_{11}H_{12}O_2$	$C_2H_5OC_6H_4CH:CHCOOH$	<i>p</i> -Ethoxycinnamic acid	192	197	(43)
$C_{12}H_{14}O_2$	$C_3H_7OC_6H_4CCH_3:CHCOOH$	<i>p</i> -Ethoxy- β -methylemnamic acid	122.5	159	(37)
$C_{12}H_{16}BrNO_2$	$BrC_6H_4CH:NC_6H_4COOH$	<i>p</i> -Bromobenzal- <i>p</i> -aminobenzoic acid	272	274	(12)
$C_{12}H_{16}ClNO_2$	$ClC_6H_4CH:NC_6H_4COOH$	<i>p</i> -Chlorobenzal- <i>p</i> -aminobenzoic acid	260	263	(12)
$C_{12}H_{16}INO_2$	$IC_6H_4CH:NC_6H_4COOH$	<i>p</i> -Iodobenzal- <i>p</i> -aminobenzoic acid	279	287	(12)
$C_{12}H_{16}O_4$	$HOC_6H_4COOC_6H_4COOH$	<i>p</i> -(<i>p</i> -Hydroxybenzoyl)-benzoic acid	258	$260 \pm$	(45)
$C_{12}H_{11}NO_2$	$C_6H_5CH:NC_6H_4COOH$	Benzal- <i>p</i> -aminobenzoic acid	183	191	(26)
$C_{12}H_{13}N_2O_2$	$O_2NC_6H_4CH:NC_6H_4OCH_3$	<i>p</i> -Nitrobenzalaminidine	135		(26)
$C_{12}H_{14}N_2O_2$	$CH_3OC_6H_4NONC_6H_4OCH_3$	<i>p</i> -Azoxyanisole	116 ± 1	135 ± 1	(1, 3, 6, 7, 9, 11, 14, 19, 23, 30, 32, 35, 36, 42, 48)
$C_{12}H_{15}N_3$	$CH_3NHC_6H_4CH:NNHC_6H_5$	<i>p</i> -Methylaminobenzalphenylhydrazine	170	190	(24)
$C_{12}H_{15}N_3O_2$	$CNC_6H_4CH:NC_6H_4COOH$	<i>p</i> -(<i>p</i> -Cyanobenzalamino)-benzoic acid	247	>320	(17)
$C_{12}H_{15}N_3O$	$CNC_6H_4CH:NC_6H_4OCH_3$	<i>p</i> -Cyanobenzalamisidine	115	125	(17)
$C_{12}H_{13}N_3O$	$CH_3OC_6H_4CH:NC_6H_4CN$	Anisal- <i>p</i> -cyanoaniline	103	113.5	(12)
$C_{12}H_{15}N_3O_4$	$CH_3COOC_6H_4N:NC_6H_4COOH$	<i>p</i> -Acetoxynazobenzoic acid	254	d.	(31)
$C_{12}H_{13}O_2$	$C_6H_5C_6H_4CH:CHCOOH$	<i>p</i> -Phenylemnamic acid	221	236	(2)
$C_{12}H_{13}O_2$	$CH_3OC_6H_4COOC_6H_4COOH$	<i>p</i> -(<i>p</i> -Methoxybenzoyl)-benzoic acid	223	272	(45)
$C_{12}H_{13}NO_2$	$CH_3C_6H_4CH:NC_6H_4COOH$	<i>p</i> -(<i>p</i> -Methylbenzalamino)-benzoic acid	220	243	(26)
$C_{12}H_{13}NO_2$	$CH_3OC_6H_4CH:NC_6H_4COOH$	<i>p</i> -(Anisalamino)-benzoic acid	197	208 d.	(18, 46)
$C_{12}H_{13}N_2O_2$	$O_2NC_6H_4CH:NC_6H_4OC_2H_5$	<i>p</i> -Nitrobenzalphenetidine	124		(26)
$C_{12}H_{13}N_2O_3$	$CH_3OC_6H_4NONC_6H_4OC_2H_5$	<i>p</i> -Anisylazoxypheitol	94 ± 1	149 ± 1	(4, 7, 32)
$C_{12}H_{15}N_3$	$C_6H_5NHC_6H_4CH:NNHC_6H_5$	<i>p</i> -Ethylaminobenzalphenylhydrazine	160	182	(24)
$C_{12}H_{13}O_4$	$CH_3COOC_6H_4COOC_6H_4COOH$	<i>p</i> -Hydroxybenzoic acid <i>p</i> -acetoxylbenzoate	228 d.	>250	(45)
$C_{12}H_{13}O_7$	$CH_3OCOOC_6H_4COOC_6H_4COOH$	<i>p</i> -Hydroxybenzoic acid <i>p</i> -carbomethoxybenzoate	218 d.	d.	(45)
$C_{12}H_{13}N_2O$	$CNC_6H_4CH:NC_6H_4OC_2H_5$	<i>p</i> -Cyanobenzalphenetidine	115	132	(17)
$C_{12}H_{13}N_2O$	$C_2H_5OC_6H_4CH:NC_6H_4CN$	<i>p</i> -Ethoxybenzal- <i>p</i> -cyanoaniline	105	124	(12)
$C_{12}H_{13}N_2O_2$	$O_2NC_6H_4CH:CHCH:NC_6H_4CH_3$	<i>p</i> -Nitrocinnamal- <i>p</i> -toluidine	130	141	(26)
$C_{12}H_{13}N_2O_2$	$O_2NC_6H_4CH:CHCH:NC_6H_4OCH_3$	<i>p</i> -Nitrocinnamalaminidine	155	160	(26)
$C_{12}H_{13}NO_2$	$CH_3OC_6H_4CH:NC_6H_4COCH_3$	Anisal- <i>p</i> -aminacetophenone	121.5	135	(18)
$C_{12}H_{13}NO_2$	$CH_3COOC_6H_4CH:NC_6H_4OCH_3$	<i>p</i> -Acetoxylbenzalamisidine	112	128	(15)
$C_{12}H_{13}NO_2$	$CH_3OC_6H_4CH:NC_6H_4OCOCH_3$	<i>p</i> -(Anisalamino)-phenol acetate	81.5	108	(18)
$C_{12}H_{13}N_2O_2$	$CH_3COC_6H_4N:NC_6H_4OC_2H_5$	<i>p</i> -Acetophenoneazophenetol	130		(47)
$C_{12}H_{13}N_2O_2$	$CH_3OC_6H_4CH:NN:CHC_6H_4OCH_3$	Anisaldazine	165 ± 3	180 ± 1	(5, 6, 7, 19)
$C_{12}H_{13}N_2O_2$	$C_2H_5OC_6H_4N:NC_6H_4OCOCH_3$	<i>p</i> -Phenetolazophenol acetate	121	138	(45, 47)
$C_{12}H_{13}N_2O_4$	$CH_3OC_6H_4N:NC_6H_4OCOOC_2H_5$	<i>p</i> -Anisylazocarbethoxyphenol	90	114	(46, 47)
$C_{12}H_{13}N_2O_4$	$CH_3OC_6H_4N:NC_6H_4OCOOC_2H_5$	<i>p</i> -Anisylazocarbethoxyphenol	137 \pm 1	167 ± 1	(3, 14, 19, 23, 30, 32, 35, 42, 48)
$C_{12}H_{13}N_2O_4$	$CH_3OC_6H_4N:NC_6H_4OCOOC_2H_5$	<i>p</i> -Azoxypheitol			(34)
$C_{12}H_{20}N_2$	$C_2H_5NHC_6H_4C_6H_4NHC_2H_5$	Diethylbenzidine	115.5	120.5	(15)
$C_{12}H_{13}NO_2$	$CH_3OC_6H_4CH:NC_6H_4CH:CHCOOH$	<i>p</i> -(Anisalamino)-cinnamic acid	208	d.	(26)
$C_{12}H_{13}N_2O_2$	$O_2NC_6H_4CH:CHCH:NC_6H_4OC_2H_5$	<i>p</i> -Nitrocinnamalphenetidine	134	137	(26)
$C_{12}H_{13}N_2O_4$	$CH_3COC_6H_4N:NC_6H_4OCOOC_2H_5$	<i>p</i> -Acetophenoneazocarbethoxyphenol	120	126	(47)
$C_{12}H_{13}N_2O_4$	$CH_3COOC_6H_4N:NC_6H_4COOC_2H_5$	Ethyl <i>p</i> -acetoxynazobenzoate	99	102	(31)
$C_{12}H_{13}NO_2$	$CH_3OC_6H_4CH:NC_6H_4CH_2CH_2COOH$	<i>p</i> -(Anisalamino)-hydrocinnamic acid	136	162	(45)
$C_{12}H_{13}N_2O_4$	$C_2H_5OC_6H_4N:NC_6H_4OCOOC_2H_5$	<i>p</i> -Phenetolazocarbethoxyphenol	96	137	(47)
$C_{12}H_{13}ClO_4$	$CH_3COOC_6H_4CH:ClC_6H_4OCOCH_3$	<i>p</i> -Dihydroxychlorostilbene diacetate	125	138	(11, 29)
$C_{12}H_{14}N_2O_4$	$CH_3COOC_6H_4CH:NN:CHC_6H_4OCOCH_3$	Di-(<i>p</i> -acetoxylbenzalazine)	185	192	(16, 40)
$C_{12}H_{13}NO_2$	$CH_3OC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Methyl anisal- <i>p</i> -aminocinnamate	150	176	(42, 47)
$C_{12}H_{13}N_2O_2$	$CH_3OC_6H_4N:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -anisylazocinnamate	116, 123*	143	(46, 47)
$C_{12}H_{13}N_2O_4$	$C_2H_5OCOOC_6H_4NONC_6H_4COOC_2H_5$	<i>p</i> -Azoxethyl benzoate	114 ± 0.6	121 ± 0.5	(7, 11, 19, 27, 40, 42, 45)
$C_{12}H_{13}N_2O_4$	$C_2H_5OCOOC_6H_4N:NC_6H_4OCOOC_2H_5$	<i>p</i> -Azocarbethoxyphenol	97	118	(15)

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{15}H_{11}N_3O_7$	$C_6H_5OOCOC_6H_4NONC_6H_4OOCOC_6H_5$	<i>p</i> -Azoxycarboxyphenol	95	130	(15)
$C_{15}H_{11}O_3$	$CH_3OC_6H_4CH:CHCH:CHC_6H_4OCH_3$	Di-(<i>p</i> -anisylbutadiene)	225	238	(34)
$C_{15}H_{10}N_2O_2$	$C_6H_5OC_6H_4CH:NN:CHC_6H_4OC_6H_5$	Di-(<i>p</i> -ethoxybenzalazine)	172	195	(13, 24, 45)
$C_{15}H_{12}N_2O_2$	$CH_3OC_6H_4C(CH_3):NN:C(CH_3)C_6H_4OCH_3$	Di-(<i>p</i> -methoxyacetophenoneazine)	195	202	(16)
$C_{15}H_{10}N_2O_4$	$HOCH_2OC_6H_4CH:NN:CHC_6H_4OC_2H_4OH$	Di-(hydroxyethoxybenzalazine)	184	207	(13)
$C_{15}H_{12}N_2O_3$	$C_6H_5OC_6H_4NONC_6H_4OC_6H_5$	Di-(<i>p</i> - <i>n</i> -propoxyazoxybenzene)	116	122	(4, 40)
$C_{15}H_{12}N_2O_3$	$CNC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -cyanobenzal- <i>p</i> -aminocinnamate	131	179	(17)
$C_{15}H_{12}N_2O_4$	$CH_3COOC_6H_4N:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -acetoxypheylazocinnamate	132	152	(47)
$C_{15}H_{11}NO_2$	$CH_3C_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -(<i>p</i> -methylbenzalamino)-cinnamate	96, 107*	118	(46, 47)
$C_{15}H_{11}NO_3$	$C_6H_5OC_6H_4CH:NC_6H_4CH:COOH$	<i>p</i> -(<i>p</i> -Ethoxybenzalamino)- α -methylcinnamic acid	180	265	(20)
$C_{15}H_{11}NO_3$	$CH_3OC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -anisalamino)-cinnamate	100, 108*, 117*	138	(9, 43, 46, 47)
$C_{15}H_{11}NO_3$	$C_6H_5OC_6H_4CH:NC_6H_4CH:CHCOOCH_3$	Methyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)-cinnamate	132	187	(43, 47)
$C_{15}H_{12}N_2O_3$	$C_6H_5OC_6H_4N:NC_6H_4OCOC_2H_5$	<i>p</i> -Phenetolazophenol <i>n</i> -valerate	78-83	125	(47)
$C_{20}H_{15}N_3O_2$	$CNC_6H_4N:NC_6H_4OCOC_2H_5$	<i>p</i> -Cyanobenzeneazophenol benzoate	181	226	(12)
$C_{20}H_{14}Br_2N_2$	$BrC_6H_4N:CHC_6H_4CH:NC_6H_4Br$	<i>p</i> -Phthalal-di-(<i>p</i> -bromoaniline)	208	288	(17)
$C_{20}H_{14}Cl_2N_2$	$ClC_6H_4N:CHC_6H_4CH:NC_6H_4Cl$	<i>p</i> -Phthalal-di-(<i>p</i> -chloroaniline)	176	282	(17)
$C_{20}H_{14}I_2N_2$	$IC_6H_4N:CHC_6H_4CH:NC_6H_4I$	<i>p</i> -Phthalal-di-(<i>p</i> -iodoaniline)	262	268	(12)
$C_{20}H_{14}N_4O_4$	$O_2NC_6H_4CH:NC_6H_4N:CHC_6H_4NO_2$	(Di- <i>p</i> -nitrobenzal)- <i>p</i> -phenylenediamine	212	315	(46)
$C_{20}H_{16}N_2O_3$	$CH_3OC_6H_4N:NC_6H_4OCOC_2H_5$	<i>p</i> -Anisylazophenol benzoate	159-163	178	(47)
$C_{20}H_{17}NO$	$CH_3OC_6H_4CH:NC_6H_4C_6H_5$	Anisal- <i>p</i> -aminodiphenyl	161	177	(12, 46)
$C_{20}H_{17}N_2O$	$CH_3OC_6H_4CH:NC_6H_4N:NC_6H_5$	Anisal- <i>p</i> -aminoazobenzene	151	182	(15, 39, 46)
$C_{20}H_{16}N_2O_3$	$CH_3OCOC_6H_4CH:NC_6H_4NONC_6H_4CH:CHCOOC_2H_5$	Methyl azoxycinnamate	221	257	(40)
$C_{20}H_{16}N_2O_3$	$CH_3OC_6H_4CH:CHCH:NN:CHCH:CHC_6H_4OCH_3$	Di- <i>p</i> -methoxycinnamicaldazine	210	218	(34)
$C_{20}H_{16}N_2O_4$	$C_6H_5COOC_6H_4CH:NN:CHC_6H_4OCOC_2H_5$	Di- <i>p</i> -propionylhydroxybenzalazine	160	187	(16)
$C_{20}H_{16}N_2O_3$	$C_6H_5OOCOC_6H_4N:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -carboxyphenolazocinnamate	114	152	(47)
$C_{20}H_{17}NO_2$	$C_6H_5OC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)-cinnamate	69, 113*, 152*	159	(43, 45, 46, 47)
$C_{20}H_{17}NO_2$	$CH_3OC_6H_4CH:CHC_6H_4CH:NC_6H_4CH:COOC_2H_5$	Ethyl <i>p</i> -(anisalamino)- α -methylcinnamate	90	93	(20, 43)
$C_{20}H_{17}NO_2$	$C_6H_5OC_6H_4CH:NC_6H_4CH:CHC_6H_4COOCH_3$	Methyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)- α -methylcinnamate	105	147	(20, 43)
$C_{20}H_{16}N_2O_2$	$C_6H_5OC_6H_4CH:CH_2:NN:C_6H_4C_6H_5O$	Di- <i>p</i> -ethoxyacetophenoneazine	142	163	(16)
$C_{21}H_{11}O_7$	$HOOC_6H_4COOC_6H_4COOC_6H_4COOH$	<i>p</i> -Hydroxybenzoic acid <i>p</i> -(<i>p</i> -hydroxybenzoxy) benzoate	283	d.	(45)
$C_{21}H_{14}N_2O_3$	$CH_3COC_6H_4N:NC_6H_4OCOC_2H_5$	<i>p</i> -Acetophenoneazophenol benzoate	211 d.		(47)
$C_{21}H_{17}NO$	$C_6H_5C_6H_4CH:NC_6H_4COCH_3$	<i>p</i> -(<i>p</i> -Phenylbenzalamino)-acetophenone	187-5		(2)
$C_{21}H_{16}N_2O_3$	$C_6H_5OC_6H_4N:NC_6H_4OCOC_2H_5$	<i>p</i> -Phenetolazophenol benzoate	173	193	(46, 47)
$C_{21}H_{17}NO$	$C_6H_5OC_6H_4CH:NC_6H_4C_6H_5$	<i>p</i> -(<i>p</i> -Ethoxybenzalamino) diphenyl	145	184	(12)
$C_{21}H_{17}NO$	$C_6H_5C_6H_4CH:NC_6H_4OC_2H_5$	<i>p</i> -Phenylbenzal- <i>p</i> -phenetidine	164	189-5	(2)
$C_{21}H_{16}N_2O$	$C_6H_5OC_6H_4CH:NC_6H_4N:NC_6H_5$	<i>p</i> -(<i>p</i> -Ethoxybenzalamino)-azobenzene	131-5	199	(2)
$C_{21}H_{17}NO_3$	$C_6H_5OOCOC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -(<i>p</i> -carboxyethoxybenzal-aminol) cinnamate	80	151	(47)
$C_{21}H_{17}NO_2$	$CH_3OC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	<i>n</i> -Butyl anisal- <i>p</i> -amino-cinnamate	58	76	(43)
$C_{21}H_{17}NO_2$	$C_6H_5OC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)- α -methylcinnamate	95	122 \pm 2	(9, 19, 20, 39, 43, 46)

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{11}H_{11}NO_2$	$CH_3OC_6H_4CH:NC_6H_4CH:CCH_2COOC_2H_5$	<i>n</i> -Propyl <i>p</i> -(anisalamino)- α -methylcinnamate	50	85	(20, 43)
$C_{11}H_{11}H_4$	$CNC_6H_4N:CHC_6H_4CH:NC_6H_4CN$	<i>p</i> -Phthalal-di-(<i>p</i> -cyanoaniline)	164	209	(12)
$C_{11}H_{11}NO_4$	$C_6H_4CH:NC_6H_4COOC_2H_5COOC_2H_5$	Methyl benzal- <i>p</i> -aminobenzoyl- <i>p</i> -hydroxybenzoate	174	177	(45)
$C_{11}H_{11}NO_2$	$C_6H_4C_6H_4CH:NC_6H_4COOC_2H_5$	Ethyl <i>p</i> -(<i>p</i> -phenylbenzalamino)-benzoate	121.5	128.5	(3)
$C_{11}H_{11}N_2$	$CH_2C_6H_4CH:NC_6H_4N:CHC_6H_4CH_2$	Di-(<i>p</i> -tolual)- <i>p</i> -phenylenediamine	194	206	(46)
$C_{11}H_{11}N_2$	$CH_2C_6H_4N:CHC_6H_4CH:NC_6H_4CH_2$	<i>p</i> -Phthalal-di-(<i>p</i> -toluidine)	186	238	(17)
$C_{11}H_{11}N_2$	$CH_2OC_6H_4CH:NC_6H_4N:CHC_6H_4OCH_3$	Dianisal- <i>p</i> -phenylenediamine	210	338	(46)
$C_{11}H_{11}N_2O_2$	$CNC_6H_4C:HN C_6H_4CH:CHCOOC_2H_5$	<i>act</i> -Amyl <i>p</i> -(<i>p</i> -cyanobenzalamino)-cinnamate	95	107	(17, 38, 46)
$C_{11}H_{11}N_2O_4$	$C_6H_4OCOCH:CHC_6H_4N:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -azoxycinnamate	155	230	(15, 43)
$C_{11}H_{11}N_2O_4$	$C_6H_4OCOCH:CHC_6H_4NONC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -azoxycinnamate	140 + 1	249 + 1	(7, 15, 28, 40, 43, 45)
$C_{11}H_{11}O_4$	$CH_2OC_6H_4CH:C_6H_4O:CHC_6H_4OCH_3$	Diansaleyclohexanone	159	170	(2, 28, 44)
$C_{11}H_{11}N_2O_4$	$C_6H_4COOC_2H_5CH:NN:CHC_6H_4O-COC_2H_5$	Di- <i>p</i> -butyryloxybenzalazime	146	181	(16)
$C_{11}H_{11}NO_2$	$CH_2OC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	<i>act</i> -Amyl anisal- <i>p</i> -aminocinnamate	49	90	(43)
$C_{11}H_{11}NO_2$	$CH_2OC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	<i>iso</i> -Amyl anisal- <i>p</i> -aminocinnamate	52	90	(43)
$C_{11}H_{11}NO_2$	$C_6H_4OC_2H_5CH:NC_6H_4CH:CHCOOC_2H_5$	<i>n</i> -Butyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)-cinnamate	68, 88*	125	(43)
$C_{11}H_{11}NO_2$	$C_6H_4OC_2H_5CH:NC_6H_4CHCOH(COO-C_2H_5)$	<i>n</i> -Propyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)- α -methylcinnamate	88	121	(20, 43)
$C_{11}H_{11}O_4$	$CH_3COOC_2H_5COOC_2H_5COO-C_6H_4COOH$	<i>p</i> -Hydroxybenzoic acid <i>p</i> -(<i>p</i> -acetoxybenzoxy)-benzoate	248	d.	(45)
$C_{11}H_{11}NO_2$	$C_6H_4C_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Methyl <i>p</i> -(<i>p</i> -phenylbenzalamino)-cinnamate	208, 216*	247	(2)
$C_{11}H_{11}NO_2$	$CH_2OC_6H_4CH:NC_6H_4COOC_2H_5COO-CH_3$	Methyl <i>p</i> -(anisalamino)-benzoyl- <i>p</i> -hydroxybenzoate	217	300	(45)
$C_{11}H_{11}NO_4$	$CH_2OC_6H_4CH:NC_6H_4CH_2OC_6H_4COOCH_3$	Methyl <i>p</i> -(anisalamino)benzyl- <i>p</i> -hydroxybenzoate	157	165	(45)
$C_{11}H_{11}O_4$	$C_6H_4OC_2H_5CH:C_6H_4O:CHC_6H_4OC_2H_5$	Di-(<i>p</i> -ethoxybenzal)-cyclopentanone	189, 194*	200	(44)
$C_{11}H_{11}NO_2$	$C_6H_4OC_2H_5CH:NC_6H_4CH:CHCOOC_2H_5$	<i>act</i> -Amyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)-cinnamate	68, 114*	121	(43)
$C_{11}H_{11}NO_2$	$C_6H_4OC_2H_5CH:NC_6H_4CH:CHCOOC_2H_5$	<i>iso</i> -Amyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)-cinnamate	81	137	(43)
$C_{11}H_{11}NO_2$	$C_6H_4OC_2H_5CH:NC_6H_4CH:CCH_2COOC_2H_5$	<i>n</i> -Butyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)- α -methylcinnamate	55, 65*	82	(20, 43)
$C_{11}H_{11}NO_2$	$CH_2OC_6H_4CH:NC_6H_4CH:CCH_2COOC_2H_5$	<i>act</i> -Amyl <i>p</i> -(anisalamino)- α -methylcinnamate	62	69	(46)
$C_{11}H_{11}O_6$	$C_6H_4OCOOC_2H_5COOC_2H_5COOC_2H_5COOH$	<i>p</i> -Hydroxybenzoic acid <i>p</i> -(<i>p</i> -carbethoxybenzoxy) benzoate	215	d.	(45)
$C_{11}H_{11}N_2O_4$	$C_6H_4COOC_2H_5N:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -benzoyloxyphenylazocinnamate	135	212	(47)
$C_{11}H_{11}NO_2$	$C_6H_4C_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -(<i>p</i> -phenylbenzalamino)-cinnamate	145, 180,* 205,* 210*	219	(2, 39, 42, 46)
$C_{11}H_{11}N_2O_4$	$CH_2OC_6H_4CH:NC_6H_4CONHC_6H_4COOC_2H_5$	Ethyl <i>p</i> -(anisalamino)-benzoyl- <i>p</i> -aminobenzoate	212, 220*	247	(45, 46)
$C_{11}H_{11}BrN_2O_4$	$C_6H_4OCOCH_2:CBrc_6H_4NONC_6H_4CBrc_6H_4COOC_2H_5$	Ethyl <i>p</i> -azoxy- α -methyl- β -bromocinnamate	110, 132*	138	(20)
$C_{11}H_{11}N_2O_2$	$C_6H_4OC_2H_5CH:NC_6H_4N:CHC_6H_4O-C_6H_5$	Di-(<i>p</i> -ethoxybenzal)- <i>p</i> -phenylenediamine	200		(2)
$C_{11}H_{11}N_2O_2$	$C_6H_4OC_2H_5N:CHC_6H_4CH:NC_6H_4O-C_6H_5$	<i>p</i> -Phthalal-di-(<i>p</i> -phenetidine)	197	324	(17)
$C_{11}H_{11}N_2O_4$	$C_6H_4OCOCH:CHC_6H_4NONC_6H_4CH:CHCOOC_2H_5$	Allyl <i>p</i> -azoxycinnamate	124	235	(40)
$C_{11}H_{11}N_2O_4$	$C_6H_4OCOCH_2:CHC_6H_4NONC_6H_4CH:CCH_2COOC_2H_5$	Ethyl <i>p</i> -azoxy- α -methylcinnamate	109, 134*	140	(20, 21)

Index formula	Formula	Name	Trans. temp.	M. P.	Lat.
$C_{12}H_{16}N_2O_4$	$C_6H_5OCOCH_2CHC_6H_4NONC_6H_4CH_2CH_2COOC_6H_5$	<i>iso</i> -Propyl <i>p</i> -azoxycinnamate. . . .	150	184	(40)
$C_{14}H_{18}N_2O_4$	$C_6H_5OCOCH_2CHC_6H_4NONC_6H_4CH_2CH_2COOC_6H_5$	<i>n</i> -Propyl <i>p</i> -azoxycinnamate. . . .	123	243	(40)
$C_{10}H_{16}O_4$	$C_6H_5OC_6H_4CH_2C_6H_4OCH_2C_6H_4OC_6H_5$	Di-(<i>p</i> -ethoxybenzal)-cyclohexanone.	146	176	(44)
$C_{10}H_{16}N_2O_4$	$C_6H_5COOC_6H_4CH_2CH_2NNCHC_6H_4OCOC_6H_5$	Di-(<i>p</i> -valerylhydroxy)-benzalazine	145	160	(16)
$C_{10}H_{16}N_2O_4$	$C_6H_5COOC_6H_4CH_2CH_2NNCHC_6H_4OCOC_6H_5$	Di-(<i>p</i> -isovalerylhydroxy)-benzalazine	131	156	(16)
$C_{14}H_{18}NO_3$	$C_6H_5OC_6H_4CH_2NC_6H_4CH_2CCH_2COOC_6H_5$	<i>act</i> -Amyl <i>p</i> -(<i>p</i> -ethoxybenzal-amino)- α -methylcinnamate	86	100	(20, 43)
$C_{14}H_{18}NO_3$	$C_6H_5OC_6H_4CH_2NC_6H_4CH_2CCH_2COOC_6H_5$	<i>iso</i> -Amyl <i>p</i> -(<i>p</i> -ethoxybenzal-amino)- α -methylcinnamate	83	90	(20, 43)
$C_{18}H_{18}N_2O_3$	$C_6H_5C_6H_4N_2NC_6H_4OCOC_6H_5$	<i>p</i> -Diphenylazophenol benzoate	194	240	(12)
$C_{18}H_{18}N_2$	$C_6H_5C_6H_4CH_2NC_6H_4N_2NC_6H_5$	<i>p</i> -(<i>p</i> -Phenylbenzal-amino)-azobenzene	207	252	(2)
$C_{18}H_{18}O_4$	$CH_3COOC_6H_4COOC_6H_4COOC_6H_4CH_2COOC_6H_5$	Ethyl <i>p</i> -hydroxybenzoate <i>p</i> -(<i>p</i> -acetoxybenzoxy) benzoate	112	282	(45)
$C_{18}H_{18}NO_4$	$C_6H_5COOC_6H_4CH_2NC_6H_4CH_2CHCOOC_6H_5$	Ethyl <i>p</i> -(<i>p</i> -benzoxybenzal-amino)-cinnamate	125	217	(47)
$C_{18}H_{18}NO_3$	$C_6H_5C_6H_4CH_2NC_6H_4CH_2CCH_2COOC_6H_5$	Ethyl <i>p</i> -(<i>p</i> -phenylbenzal-amino)- α -methylcinnamate	120, 148*	175	(20, 43)
$C_{18}H_{18}N_2O_3$	$C_6H_5OCOCH_2CHC_6H_4NONC_6H_4CH_2CH_2COOC_6H_5$	<i>n</i> -Propyl <i>p</i> -azoxy- α -methylcinnamate	70, 125*?	128	(20)
$C_{18}H_{18}Br_2N_2$	$BrC_6H_4CH_2NC_6H_4C_6H_4N_2CHC_6H_4Br$	Di-(<i>p</i> -bromobenzal)-benzidine	285	312	(12)
$C_{18}H_{18}Cl_2N_2$	$ClC_6H_4CH_2NC_6H_4C_6H_4N_2CHC_6H_4Cl$	Di-(<i>p</i> -chlorobenzal)-benzidine	265	318	(12)
$C_{18}H_{18}Cl_2NO$	$ClC_6H_4N_2CHC_6H_4NONC_6H_4CH_2CH_2NC_6H_4Cl$	<i>p</i> -Azoxybenzal-di- <i>m</i> -chloraniline	174, 181,* 198*	213	(46)
$C_{18}H_{18}I_2N_2$	$IC_6H_4CH_2NC_6H_4C_6H_4N_2CHC_6H_4I$	Di-(<i>p</i> -iodobenzal)-benzidine	> 300		(12)
$C_{18}H_{18}N_2O_4$	$C_6H_5COOC_6H_4N_2NC_6H_4OCOC_6H_5$	<i>p</i> -Dibenzoylazophenol	208	250	(15, 39)
$C_{18}H_{18}N_2O_3$	$C_6H_5COOC_6H_4NONC_6H_4OCOC_6H_5$	<i>p</i> -Dibenzoylazoxyphenol	192	280	(15)
$C_{18}H_{18}N_2O_4$	$O_3NC_6H_4CONHC_6H_4C_6H_4NHCO-C_6H_4NO_2$	Di-(<i>p</i> -nitrobenzoyl)-benzidine	365	d.	(45)
$C_{18}H_{18}O_4$	$C_6H_5OCOC_6H_4C_6H_4COOC_6H_5$	Diphenyl <i>p</i> , <i>p'</i> -diphenylcarboxylate	213	245	(45)
$C_{18}H_{18}N_2$	$C_6H_5CH_2NC_6H_4C_6H_4N_2CHC_6H_5$	Dibenzalbenzidine	234	260	(6, 24)
$C_{18}H_{18}N_4$	$C_6H_5C_6H_4CH_2NNCHC_6H_4C_6H_5$	Di- <i>p</i> -phenylbenzalazine	245	271	(2)
$C_{18}H_{18}N_4$	$CH_3C_6H_4CH_2NC_6H_4N_2CHC_6H_4CH_3$	Di- <i>p</i> -tolual-1, 5-naphthylenediamine	210	230	(46)
$C_{18}H_{18}N_2O_3$	$CH_3OC_6H_4CH_2NC_6H_4N_2CHC_6H_4CH_3$	Dimethyl-1, 5-naphthylenediamine	206	313	(46)
$C_{18}H_{18}N_2O_2$	$H_2NC_6H_4CONHC_6H_4C_6H_4NHCO-C_6H_4NH_2$	Di-(<i>p</i> -aminobenzoyl)-benzidine	312	d.	(45)
$C_{18}H_{18}N_2O_4$	$C_6H_5CH_2NC_6H_4COOC_6H_5$	Ethyl <i>p</i> -phthalal-di-(<i>p</i> -aminobenzoate)	189	230	(17)
$C_{18}H_{18}NO_4$	$C_6H_5C_6H_4CH_2NC_6H_4CH_2CHCOOC_6H_5$	<i>n</i> -Butyl <i>p</i> -phenylbenzal- <i>p</i> -aminocinnamate	167	203	(43)
$C_{18}H_{18}N_2O_4$	$C_6H_5COOC_6H_4CH_2CHC_6H_4NONC_6H_4CH_2CH_2COOC_6H_5$	Allyl <i>p</i> -azoxy- α -methylcinnamate.	75	115	(20)
$C_{18}H_{18}N_2O_3$	$C_6H_5OCOCH_2COOC_6H_4CHC_6H_4NONC_6H_4CH_2CH_2COOC_6H_5$	<i>p</i> -Azoxycinnamic acid ethyl glycolate ester	148	235	(40)
$C_{18}H_{18}N_2O_4$	$C_6H_5OCOCH_2CHC_6H_4NONC_6H_4CH_2CH_2COOC_6H_5$	<i>n</i> -Butyl <i>p</i> -azoxycinnamate . . .	111	214	(40)
$C_{17}H_{17}NO_3$	$C_6H_5C_6H_4CH_2NC_6H_4CH_2CHCOOC_6H_5$	<i>act</i> -Amyl <i>p</i> -(<i>p</i> -phenylbenzal-amino)-cinnamate	115, 153*	180	(43)
$C_{17}H_{17}NO_3$	$C_6H_5C_6H_4CH_2NC_6H_4CH_2CHCOOC_6H_5$	<i>iso</i> -Amyl <i>p</i> -(<i>p</i> -phenylbenzal-amino)-cinnamate	164, 188*	197	(43)
$C_{17}H_{17}NO_2$	$C_6H_5C_6H_4CH_2NC_6H_4CH_2CH_2CCH_2COOC_6H_5$	<i>n</i> -Butyl <i>p</i> -(<i>p</i> -phenylbenzal-amino)- α -methylcinnamate	99, 137*	149	(20, 43, 46)
$C_{17}H_{17}NO_2$	$C_6H_5C_6H_4OCH_2NC_6H_4CH_2CH_2CC_6H_5COOC_6H_5$	<i>n</i> -Propyl <i>p</i> -(<i>p</i> -phenylbenzal-amino)- α -ethylcinnamate	119	135	(20, 21, 43)
$C_{18}H_{18}O_4$	$C_6H_5COOC_6H_4C_6H_4CC_6H_4OCOC_6H_5$	Di- <i>p</i> -oxytolanediobenzoate	214	254	(41)
$C_{18}H_{18}N_2O_4$	$C_6H_5COOC_6H_4CH_2CH_2NNCHC_6H_4OCOC_6H_5$	Di- <i>p</i> -benzoxybenzalazine.	227	290	(16, 40)

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
C ₂₂ H ₂₀ O ₄	C ₆ H ₅ COOC ₆ H ₄ CH:CHC ₆ H ₄ OCOC ₆ H ₅	Di- <i>p</i> -hydroxystilbene dibenzoate	224	285 d.	(41)
C ₂₇ H ₂₄ N ₂	(C ₆ H ₄ N:CHC ₆ H ₄ CH ₃) ₂	Di-(<i>p</i> -tolual)-benzidine	231	>300	(8, 24)
C ₂₇ H ₂₄ N ₂ O ₂	(C ₆ H ₄ N:CHC ₆ H ₄ OC ₂ H ₅) ₂	Dianisalbenzidine	258		(46)
C ₂₇ H ₂₂ N ₂ O ₄	C ₆ H ₅ COOC ₆ H ₄ N:NC ₆ H ₄ CH:CHC ₆ H ₅ -COOC ₆ H ₅	<i>act</i> -A m y l <i>p</i> -benzoylazophenol- α -methylcinnamate	88	120	(20)
C ₂₇ H ₂₄ N ₂ O ₄	C ₆ H ₅ OCOC ₆ H ₄ CH:CHC ₆ H ₄ NONC ₆ H ₄ -CH:CHCOCOC ₆ H ₅	<i>iso</i> -Amyl <i>p</i> -azoxycinnamate	144	186	(40)
C ₂₇ H ₂₄ N ₂ O ₄	C ₆ H ₅ OCOCCH ₂ :CHC ₆ H ₄ NONC ₆ H ₄ -CH:CHC ₆ H ₅ COOC ₆ H ₅	<i>iso</i> -B u t y l <i>p</i> - α -o x y- α -methylcinnamate	86, 110*	125.5	(20)
C ₂₇ H ₂₄ N ₂ O ₄	C ₆ H ₅ OCOCCH ₂ :CHC ₆ H ₄ NONC ₆ H ₄ -CH:CHC ₆ H ₅ COOC ₆ H ₅	<i>n</i> -Butyl <i>p</i> -azoxy- α -methylcinnamate	60	100	(20)
C ₂₆ H ₂₂ N ₂ O ₄	C ₆ H ₅ COCH:CHC ₆ H ₄ NONC ₆ H ₄ CH:CHCOCOC ₆ H ₅	<i>p</i> -Azoxybenzalacetophenone	213		(47)
C ₂₆ H ₂₂ N ₂ O ₂	(C ₆ H ₄ N:CHC ₆ H ₄ OC ₂ H ₅) ₂	Di-(<i>p</i> -ethoxybenzal)-benzidine	248	>300	(13)
C ₂₆ H ₂₂ N ₂ O ₂	(C ₆ H ₄ N:CHC ₆ H ₄ CH ₃ OC ₂ H ₅) ₂	Di-(<i>p</i> -m e t h o x y- α -methylbenzal)-benzidine	171	>300	(13)
C ₂₆ H ₂₂ N ₂ O ₄	C ₆ H ₄ (CH:NC ₆ H ₄ CH:CHCOCOC ₆ H ₅) ₂	E t h y l <i>p</i> -phthalal-di-(<i>p</i> -aminocinnamate)	174, 270*	310	(17)
C ₂₆ H ₄₀ O ₂	C ₂₇ H ₄ COOC ₂₇ H ₄₅	Cholesterol propionate	97 \pm 2	112 \pm 2	(6, 10, 18, 30)
C ₂₆ H ₄₀ O ₄	C ₂₇ H ₄ OCOCOC ₂₇ H ₄₅	Cholesterol ethyl carbonite	83	103.5	(8)
C ₂₇ H ₄₂ O ₄	C ₂₇ H ₄ COOC ₂₇ H ₄₅	Cholesterol <i>n</i> -butyrate	96.4	107.3	(18)
C ₂₇ H ₄₂ O ₃	C ₂₇ H ₄ OCOCOC ₂₇ H ₄₅	Cholesterol <i>n</i> -propyl carbonate	99	101	(8)
C ₂₇ H ₂₄ N ₂	C ₆ H ₄ (N:CHC ₆ H ₄ C ₆ H ₅) ₂	Di-(<i>p</i> -p h e n y l b e n z a l)- <i>p</i> -phenyl-enediamine	284	>300	(2)
C ₂₇ H ₂₄ N ₂ O ₄	C ₆ H ₅ CH:CHCOCOC ₆ H ₄ CH:NN:CH-C ₆ H ₄ OCOCCH:CHC ₆ H ₅	Di-(<i>p</i> -cinnamylhydroxy)-benzalazine	206	245	(16)
C ₂₇ H ₂₄ O ₁₀	CH ₃ COOC ₆ H ₄ COOC ₆ H ₄ COOC ₆ H ₄ -COOC ₆ H ₄ COOC ₆ H ₅	Ethyl <i>p</i> -hydroxybenzoate- <i>p</i> -(<i>p</i> -acetoxybenzoyl)benzoxybenzoate	187 d.	d.	(48)
C ₂₇ H ₂₆ O	C ₆ H ₅ C ₆ H ₄ CH:CHC ₆ H ₄ O:CHC ₆ H ₄ C ₆ H ₅	Di-(<i>p</i> -phenylbenzal)-cyclohexanone	236.5	237.5	(2)
C ₂₇ H ₂₂ N ₂ O ₂	C ₆ H ₅ OC ₆ H ₄ C ₆ H ₅ CH:NC ₆ H ₄ C ₆ H ₅ N-C ₆ H ₄ CH:CHCOCOC ₆ H ₅	Di-(<i>p</i> -ethoxy- α -m e t h y l b e n z a l)-benzidine	167	>300	(13)
C ₂₇ H ₄₄ O ₂	C ₂₇ H ₄ COOC ₂₇ H ₄₅	Cholesterol valerate	91.8	99.2	(18)
C ₂₇ H ₄₄ O ₄	C ₂₇ H ₄ OCOCOC ₂₇ H ₄₅	Cholesterol <i>n</i> -butyl carbonate	78	90	(8)
C ₂₇ H ₄₂ O ₃	C ₂₇ H ₄ COOC ₆ H ₄ CH:CHC ₆ H ₄ O:CHC ₆ H ₄ OCOC ₆ H ₅	Di-(<i>p</i> -benzoylbenzal)- <i>e</i> -y e l o p e n -tanone	234	236	(44)
C ₂₇ H ₄₄ O ₂	C ₂₇ H ₄ COOC ₂₇ H ₄₅	Cholesterol capronate	91.2	100	(18)
C ₂₈ H ₂₂ N ₂ O ₇	C ₆ H ₅ COCH ₂ OCOCH:CHC ₆ H ₄ NON-C ₆ H ₄ CH:CHCOCOC ₆ H ₅ COOC ₆ H ₅	Phenacyl <i>p</i> -azoxycinnamate	231	238	(40)
C ₂₈ H ₂₄ N ₂ O ₄	C ₆ H ₇ OCOCCH:CHC ₆ H ₄ NONC ₆ H ₄ -CH:CHCOCOC ₆ H ₅	<i>n</i> -Octyl <i>p</i> -azoxycinnamate	94	175	(40)
C ₂₈ H ₄₀ O ₂	C ₂₇ H ₄ COOC ₂₇ H ₄₅	Cholesterol benzoate	146 \pm 1	178.5 \pm 0.3	(18, 22, 30, 35, 42, 46)
C ₂₈ H ₄₀ N ₂ O ₄	C ₆ H ₄ (CH:NC ₆ H ₄ CH:CHCOCOC ₆ H ₅) ₂	<i>act</i> -Amyl <i>p</i> -phthalal-di-(<i>p</i> -aminocinnamate)	133, 195*	268	(17)
C ₂₈ H ₄₀ N ₂ O ₄	C ₆ H ₇ OCOCCH ₂ :CHC ₆ H ₄ NONC ₆ H ₄ -CH:CHC ₆ H ₅ COOC ₆ H ₅	<i>n</i> -Octyl <i>p</i> -azoxy- α -methylcinnamate	41, 62*	85	(20)
C ₂₇ H ₄₆ O ₂	C ₂₇ H ₄ COOC ₂₇ H ₄₅	Cholesterol caprinate	82.2	90.6	(18)
C ₂₈ H ₄₄ N ₂ O ₄	C ₆ H ₄ (CH:NC ₆ H ₄ CH:CHC ₆ H ₄ COO-C ₆ H ₁₁) ₂	<i>act</i> -Amyl <i>p</i> -phthalal-di-(<i>p</i> -amino- α -methylcinnamate)	144, 211*	248	(17)
C ₂₆ H ₂₂ N ₂ O ₆	(C ₆ H ₄ NHCOC ₆ H ₄ N:CHC ₆ H ₄ NO) ₂	Di-(<i>m</i> -nitrobenzal- <i>p</i> -aminobenzoyl)-benzidine	>370	d.	(48)
C ₂₆ H ₂₄ N ₄	C ₆ H ₅ CH:NC ₆ H ₄ CH ₂ NHC ₆ H ₄ C ₆ H ₅ N-CHCH ₂ C ₆ H ₄ N:CHC ₆ H ₅	Di- <i>p</i> -(benzalamino benzyl)-benzidine	217	246 d.	(46)
C ₂₈ H ₂₂ N ₄ O ₂	(C ₆ H ₄ NHCH ₂ C ₆ H ₄ N:CHC ₆ H ₄ OC ₂ H ₅) ₂	Di- <i>p</i> -(anisalamino benzyl)-benzidine	202 d.	d.	(48)
C ₂₆ H ₂₂ N ₂ O ₄	C ₆ H ₅ OCOCCH:CHC ₆ H ₄ NONC ₆ H ₄ -CH:CHCOCOC ₆ H ₅	<i>n</i> -Cetyl <i>p</i> -azoxycinnamate	105	141	(40)
C ₂₈ H ₂₂ N ₂ O ₄	C ₆ H ₇ OCOCCH ₂ :CHC ₆ H ₄ NONC ₆ H ₄ -CH:CHC ₆ H ₅ COOC ₆ H ₅	<i>n</i> -Cetyl <i>p</i> -azoxy- α -methylcinnamate	77	84	(20)
C ₂₈ H ₄₀ O ₂	C ₂₇ H ₄ OCOCOC ₂₇ H ₄₅	Cholesterol carbonate	177	235	(8)
C ₂₈ H ₂₂ ClHgNO	CH ₃ OC ₆ H ₄ CH:NC ₆ H ₄ HgCl	<i>p</i> -Anisalamino phenylmercury chloride	274	d.	(46)

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{15}H_{13}ClHgN$	$C_6H_5CH:CHCH:NC_6H_4HgCl$	<i>p</i> -Cinnamaminophenylmercury chloride.....	255	265	(46)
$C_{15}H_{13}HgNO_2$	$CH_3OC_6H_4CH:NC_6H_4HgOCOCH_3$	<i>p</i> -Anisulaminophenylmercury acetate	177	180	(46)
$C_{22}H_{15}HgN_2O_4$	$O_2NC_6H_4CH:NC_6H_4HgC_6H_4N:CHC_6H_4NO_2$	Mercury di-(<i>p</i> -nitrobenzalamino-phenyl).....	236	241	(46)
$C_{22}H_{15}HgN_2$	$C_6H_5CH:NC_6H_4HgC_6H_4N:CHC_6H_5$	Mercury di-(benzalamino-phenyl)	180	184	(46)
$C_{22}H_{15}HgN_2$	$Hg(C_6H_4N:CHC_6H_4CH_3)_2$	Mercury di-(<i>p</i> -toluylaminophenyl)	217	229	(46)
$C_{22}H_{15}HgN_2O_2$	$Hg(C_6H_4N:CHC_6H_4OCH_3)_2$	Mercury di-(anisulaminophenyl)	209	285	(46)
$C_{20}H_{13}HgN_2$	$Hg(C_6H_4N:CHCH:CHC_6H_5)_2$	Mercury di-(cinnamaminophenyl)	208	269	(46)
$C_{20}H_{13}HgN_2O_2$	$Hg(C_6H_4N:CHC_6H_4OC_2H_5)_2$	Mercury di-(<i>p</i> -ethoxybenzalamino-phenyl)	204	272	(46)

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(For a key to the periodicals see end of volume)

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CRYSTALLOGRAPHY OF COMPOUNDS OF CARBON

GEORGE L. KEENAN AND RAYMOND M. HANN

Standard arrangement. For abbreviations, see p. 100. Literature, p. 338

B-TABLE

Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
16 See C-Table								
18 $8(C_6H_5)_4N_4$	Silico tetraphenylamide	M	Bi	-	17° 40'		Ax. pl. b (010); $X\wedge c = 271^\circ$ in obtuse $\angle\beta$	(G)
$8(C_6H_5)_4N_4$	Tetra- <i>p</i> -tolylsilene	M	Bi	-		83° 30'	Ax. pl. \perp b(010)	(G)
$8(C_6H_5)_4N_4Cl_4$	<i>p</i> -Toluidine tin chloride	M	Bi	+	77°		Ax. pl. \perp b(010); $Z\wedge c = 10^\circ$ in obtuse $\angle\beta$	(G)
23 $PbC_6H_5O_4$	Lead formate	R	Bi	-	70° 34'		Ax. pl. b(010), $X\parallel c$	(G)
$PbC_6H_5O_4 \cdot 3H_2O$	Lead acetate	M	Bi	+	83° 55'		Ax. pl. b(010), $Z\wedge c = 55^\circ 18'$ in obtuse $\angle\beta$	(G)
$PbC_6H_5O_4 \cdot 8H_2O$	Lead sulfocamphylate	R	Bi	-		78° 17'	Ax. pl. b(010), $X\parallel c$	(G)
27 $TlC_6H_5O_4$	Thallium acid oxalate	M	Bi	+		74° 5'	Ax. pl. \perp b(010)	(G)
$TlC_6H_5O_4 \cdot 4H_2O$	Thallium acid oxalate	M	Bi	+		106° 5' (red)	Ax. pl. b(010), $Z\wedge c = 70^\circ 36'$ (red) in obtuse $\angle\beta$	(G)
$Tl_2C_6H_5O_4$	Thallium mesotartarate	Tri	Bi	+	73° 54'			(G)
$Tl_2C_6H_5O_4 \cdot 4H_2O$	Thallium tartrate	R, (?)	Bi	-		69°	Ax. pl. b(010), $X\parallel c$	(G)
$Tl_2C_6H_5O_4 \cdot 8H_2O$	Thallium perate	M	Bi	-			Ax. pl. b(010)	(G)
$Tl_2C_6H_5O_4$	Thallium di-tartrate	M	Bi	+	88° 22'		Ax. pl. b(010), $Z\wedge c = 84^\circ 44'$ in obtuse $\angle\beta$	(G)
$Tl_2C_6H_5O_4$	Thallium tartrate	Trig	Un	+				(G)
$Tl_2C_6H_5O_4 \cdot 8H_2O$	Thallium antimonyl tartrate	R	Bi	-		20°-25°		(G)
28 $ZnC_6H_5O_4 \cdot 3H_2O$	Zinc acetate	M	Bi	+	84° 30'		Ax. pl. b(010), $Z\wedge c = 54^\circ 75'$ in acute $\angle\beta$	(G)
$ZnC_6H_5O_4$	Zinc butyrate	M	Bi	+		Large		(37)
$ZnC_6H_5O_4$	Zinc methylethylvalerate	?	Bi	-				(37)
$ZnC_6H_5O_4 \cdot Br \cdot 8H_2O$	Zinc bromomesaconate	M	Bi	-	71° 21'	118° 15'	Ax. pl. \perp b(010); $X\wedge c = 14^\circ$ in obtuse $\angle\beta$	(G)
$ZnC_6H_5O_4 \cdot 8H_2O$	Zinc naphthalene-1, 5-disulfonate	M	Bi	-	58° 16'		Ax. pl. \parallel (010); $\pi\wedge c = 74^\circ$	(41)
$ZnC_6H_5O_4 \cdot 8H_2O$	Phenylmethylethylammonium zinc iodide	M	Bi	+	80° 52'		Ax. pl. \perp b(010); $Z\wedge c = 43^\circ$ in acute $\angle\beta$	(G)
$ZnC_6H_5O_4 \cdot 8H_2O$	Triacetonehydrazine hydrochloride zinc chloride	M	Bi	+	36° 14'	58° 20'	Ax. pl. \perp b(001); $Z\wedge c = 49^\circ$ in obtuse $\angle\beta$	(G)
30 $HgC_6H_5N_4$	1, 1-Dimethylammonium mercuric iodide	M	Bi	-	Large			(16)
$HgC_6H_5N_4$	1, 1-Trimethylammonium mercuric iodide	R	Bi	-	Large			(16)
$HgC_6H_5N_4$	1, 1-Diethylammonium mercuric chloride	R	Bi	+	Very large			(16)
$Cu_2C_6H_5O_4 \cdot 4H_2O$	Cupric formate	M	Bi	-	34° 54'	55° 6'	Ax. pl. b(010); $X\wedge c = 23^\circ 35'$ in obtuse $\angle\beta$	(G)
$Cu_2C_6H_5O_4 \cdot 6H_2O$	Copper naphthalene-1, 5-disulfonate	M	Bi	-			Ax. pl. \parallel (010); $\pi\wedge c = 75^\circ$	(14)

Ag 45 13 33 B Ba Be Bi Br 84 70 76 16 6 C Ca Cb Cd Ce 16 77 81 29 59 Cl Co Cr Cs Cu 4 44 46 85 31 Dy Er Eu F Fe 67 69 64 3 43 Ga Gd Ge Gl H 25 65 20 75 2 Hf Hg Ho I In 73 30 68 6 36 Ir K La Li Lu 36 53 58 81 73

Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
32 $\text{Ag}_2\text{C}_4\text{H}_4\text{O}_4\text{N}_4$	Ethylene dicyanide silver nitrate	R	Bi	—	42° 30' 5'		Ax. pl. c(001); X||b	(G)
$\text{Ag}_2\text{C}_4\text{H}_4\text{O}_4\text{N}_4$	Ethylene dicyanide silver nitrate	R	Bi	—	42° 41'		Ax. pl. c(001); X||a	(G)
$\text{AuCl}_3\text{H}_2\text{S}_2\text{Cl}$	Gold dibenzylsulfine chloride (meta-stable form)	Tet	Un					(G)
$\text{AuCl}_3\text{H}_2\text{NCl}_2$	Piperidine chlorosulfate	R	Bi	+		70° 40'	Ax. pl. b(010); Z||c	(G)
$\text{AuCl}_3\text{H}_2\text{O}_2\text{N}_2\text{Cl}_2\text{H}_2\text{O}$	δ -Aminovalene acid chlorosulfate	M	Bi	—		70° (apprx.)	Ax. pl. \perp b(010); $X\wedge c = 91.8^\circ$ in obtuse $\angle\beta$	(G)
$\text{AuCl}_3\text{H}_2\text{NCl}_2$	3, 4, 5, 6-Tetramethyl-1, 2-dihydro-pyridine hydrochloride chlorosulfate	M	Bi	+		91° (apprx.)	Ax. pl. \perp b(010)	(G)
$\text{K}_2\text{IrCl}_6\text{O}_4\text{Cl}_2\text{H}_2\text{O}$	Iridium tetrachloro tripotassium oxalate	R	Bi	—		94° 40'	Ax. pl. (010), $\text{B}_{222} \perp (001)$	(22)
37 $\text{PtCl}_3\text{H}_2\text{N}_2\text{Cl}_2$	Methylammonium chloroplatinate	C						(21)
$\text{PtCl}_3\text{H}_2\text{N}_2\text{Cl}_2$	Pyridine chloroplatinate	Tr	Bi	—		50° 54'	Ax. pl. nearly \perp c-axis	(G)
$\text{PtCl}_3\text{H}_2\text{O}_2\text{N}_2\text{Cl}_2$	Choline chloroplatinate	M	Bi	+		25° 52'	Ax. pl. \perp b(010); $Z\wedge c = 73^\circ 12'$ in acute $\angle\beta$	(G)
$\text{PtCl}_3\text{H}_2\text{N}_2\text{Cl}_2$	α -Picoline chloroplatinate	M	Bi	—		93° 13' 5'	Ax. pl. b(010)	(G)
$\text{PtCl}_3\text{H}_2\text{N}_2\text{Cl}_2$	1-Phenyl-3-imino-5-methyl triazoline chloroplatinate	M	Bi				Ax. pl. b(010); Z nearly \perp c(001)	(G)
$\text{PtCl}_3\text{H}_2\text{O}_2\text{N}_2\text{Cl}_2 \cdot 2\text{H}_2\text{O}$	Pipecoline acid chloroplatinate	M	Bi			66° 56'	Ax. pl. b(010)	(G)
$\text{PtCl}_3\text{H}_2\text{O}_2\text{N}_2\text{Cl}_2$	α -Homobetaine chloroplatinate	M	Bi	+	88° 12'		Ax. pl. b(010), $Z\wedge c = 99^\circ$ in obtuse $\angle\beta$	(G)
$\text{PtCl}_3\text{H}_2\text{N}_2\text{Cl}_2$	Ethyl pyridine chloride chloroplatinate	R	Bi	—		44°	Ax. pl. a(100), X||c	(G)
$\text{PtCl}_3\text{H}_2\text{N}_2\text{Cl}_2$	Dipropyl carbinol amine chloroplatinate	M	Bi	—		72° 40'	Ax. pl. \perp b(010); X nearly \perp c(001)	(G)
$\text{PtCl}_3\text{H}_2\text{O}_2\text{N}_2\text{Cl}_2$	Tropanine chloroplatinate	M	Bi			52° 12'	Ax. pl. \perp b(010)	(G)
$\text{PtCl}_3\text{H}_2\text{N}_2\text{Cl}_2$	Tropidine chloromethylate chloroplatinate	R	Bi	+		70°	Ax. pl. b(010); Z||c	(G)
$\text{PtCl}_3\text{H}_2\text{N}_2\text{Cl}_2$	Ethylpropyl ammonium chloroplatinate	R	Bi			61° 20'	Ax. pl. c(001); Z||a	(G)
$\text{PtCl}_3\text{H}_2\text{N}_2\text{Cl}_2$	Anhydrolupinium chloroplatinate (stable mod.)	M	Bi			38° (apprx.)	Ax. pl. \perp b(010)	(G)
$\text{PtCl}_3\text{H}_2\text{N}_2\text{Cl}_2$	Diethyl-p-toluidine chloroplatinate	R	Bi	+	63° 0'		Ax. pl. a(100), Z||b	(G)
39 $\text{RuCl}_3\text{H}_2\text{O}_2\text{Cl}_2$	Ruthenium ammonium chloral hydrate	M	Bi		56° 20'			(L-2)
$\text{MnCl}_3\text{H}_2\text{O}_2\text{Cl}_2 \cdot 5\text{H}_2\text{O}$	Manganese perate	R	Bi	—		15° 30'	Ax. pl. b(010); X||c	(G)
43 $\text{FeCl}_3\text{H}_2\text{O}_2\text{Cl}_2 \cdot 5\text{H}_2\text{O}$	Ferrous pierate	R	Bi	—		24° 48'	Ax. pl. a(100); X||c	(G)
$\text{FeCl}_3\text{H}_2\text{O}_2$	Ferriacetylacetone	R	Bi	—		50° (apprx.)	Ax. pl. a(100); X||c	(G)
$\text{FeCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 6\text{H}_2\text{O}$	Ferrous naphthalene- β -sulfonate		Bi	+				(1)
44 $\text{CoCl}_3\text{H}_2\text{O}_2 \cdot 4\text{H}_2\text{O}$	Cobalt acetate	M	Bi	—	30° 13'	48° 12'	Ax. pl. b(010); $X\wedge c = 53.5^\circ$ in acute $\angle\beta$	(G)
$\text{CoCl}_3\text{H}_2\text{N}_2\text{Cl}_2 \cdot \text{H}_2\text{O}$	d-Luteo trimethylenediamine cobalt iodide	R	Bi	+		Small	Ax. pl. (001); $\text{B}_{222} = \text{b-axis}$	(18)
$\text{CoCl}_3\text{H}_2\text{N}_2\text{Cl}_2 \cdot \text{H}_2\text{O}$	dl-Luteo trimethylenediamine cobalt iodide	R	Bi			Small	Ax. pl. (010), $\text{B}_{222} = \text{c-axis}$	(18)
$\text{CoCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 6\text{H}_2\text{O}$	Cobalt naphthalene-1, 5-disulfonate	M	Bi		61° 40'		Ax. pl. (010); $\eta_{\alpha} \wedge c = 72^\circ 0.5'$	(41)
$\text{NiCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 6\text{H}_2\text{O}$	Nickel naphthalene-1, 5-disulfonate	M	Bi		50° 56'		Ax. pl. (010); $\eta_{\alpha} \wedge c = 74^\circ$	(41)
49 $\text{UCl}_3\text{H}_2\text{O}_2\text{N}$	Ammonium uranyl acetate	Tet	Un					(G)
$\text{UCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 6\text{H}_2\text{O}$	Cadmium uranylacetate	R	Bi	—		57° 54' (red)	Ax. pl. a(100)	(G)
$\text{UMnCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 6\text{H}_2\text{O}$	Manganese uranyl acetate	R	Bi	—		31°	Ax. pl. a(100)	(G)
$(\text{UO}_2)_3\text{CoCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 7\text{H}_2\text{O}$	Cobalt diuranyl acetate	R	Bi	—		103° 30'	Ax. pl. c(001)	(G)
55 $\text{AlCl}_3\text{O}_2\text{N}_2 \cdot 18\text{H}_2\text{O}$	Mellite	Tet	Un					(24)
$\text{YCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 18\text{H}_2\text{O}$	Yttrium ethyl sulfate	H	Un					(24)
$\text{YCl}_3\text{H}_2\text{O}_2\text{N}_2\text{S}_2 \cdot 7\text{H}_2\text{O}$	Yttrium m-nitrobenzenesulfonate	M	Bi	+			Ax. pl. b(010); $Z\wedge c = 85^\circ$ in obtuse $\angle\beta$	(G)
58 $\text{LaCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 18\text{H}_2\text{O}$	Lanthanum ethyl sulfate	H	Un					(24)
$\text{CeCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 18\text{H}_2\text{O}$	Cerium ethyl sulfate	H	Un					(24)
60 $\text{PrCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 18\text{H}_2\text{O}$	Praseodymium ethyl sulfate	H	Un					(24)
$\text{NdCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 18\text{H}_2\text{O}$	Neodymium ethyl sulfate	H	Un					(24)
63 $\text{SmCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 18\text{H}_2\text{O}$	Samarium ethyl sulfate	H	Un					(24)
$\text{EuCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 18\text{H}_2\text{O}$	Europium ethyl sulfate	H	Un					(24)
$\text{GdCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 18\text{H}_2\text{O}$	Gadolinium ethyl sulfate	H	Un					(24)
67 $\text{DyCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 18\text{H}_2\text{O}$	Dysprosium ethyl sulfate	H	Un					(24)
$\text{ErCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 18\text{H}_2\text{O}$	Erbium ethyl sulfate	H	Un					(24)
$\text{TmCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 18\text{H}_2\text{O}$	Thulium ethyl sulfate	H	Un					(24)
$\text{YbCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 18\text{H}_2\text{O}$	Neodymium ethyl sulfate	H	Un					(24)
75 $\text{BeCl}_3\text{H}_2\text{O}_2\text{N}_2$	Ammonium beryllium oxalate	M	Bi			27° 47'	Ax. pl. b(010), $Z\wedge c = 37.5^\circ$ in obtuse $\angle\beta$	(G)
$\text{Be}_2\text{Cl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 4\text{H}_2\text{O}$	Diethyl beryllium sulfate (basic)	Tet	Un					(24)
$\text{MgCl}_3\text{H}_2\text{O}_2 \cdot 4\text{H}_2\text{O}$	Magnesium acetate	M	Bi	—	50° 34'	89° 54'	Ax. pl. b(010); $X\wedge c = 48.25^\circ$ in acute $\angle\beta$	(G)
$\text{MgCl}_3\text{H}_2\text{O}_2 \cdot 2.5\text{H}_2\text{O}$	Magnesium diacetate.	M	Bi	+		79° (apprx.)	Ax. pl. b(010)	(G)
$\text{MgCl}_3\text{H}_2\text{O}_2 \cdot 6\text{H}_2\text{O}$	Magnesium dl-tartrate	M	Bi	—		102°	$\text{B}_{222} \wedge c = 30^\circ$ in acute $\angle\beta$	(17)
$\text{MgCl}_3\text{H}_2\text{O}_2\text{S}_2 \cdot 6\text{H}_2\text{O}$	Magnesium naphthalene-1, 5-disulfonate	M	Bi		52° 20'		Ax. pl. (010); $\eta_{\alpha} \wedge c = 73^\circ 0.5'$	(41)
77 $\text{CaCl}_3\text{O}_2 \cdot \text{H}_2\text{O}$	Calcium oxalate	M	Bi	+	80°		Ax. pl. b(010); $Z\wedge c = 64.25^\circ$ in acute $\angle\beta$	(24)
$\text{CaCl}_3\text{H}_2\text{O}_2$	Calcium formate	R	Bi	+	26° 47'	41° 2'	Ax. pl. b(010); Z||a	(G)
$\text{CaCl}_3\text{H}_2\text{O}_2 \cdot 2\text{H}_2\text{O} (?)$	Calcium malonate	?	Bi	+		moderate		(27)
$\text{CaCl}_3\text{H}_2\text{O}_2 \cdot 2\text{H}_2\text{O}$	Calcium fumarate	R	Bi	—	22° 24'	37° (apprx.)	X = a, Y = b, Z = c	(28)
$\text{CaCl}_3\text{H}_2\text{O}_2 \cdot \text{H}_2\text{O}$	Calcium maleate	R	Bi	—	77° 36' (calc.)	164° (calc.)	X = c, Y = a, Z = b	(28)

Mg Mn Mo Ni Na Nb Nd Ni O Os P Pb Pd Pt Rh Ru S Se Sb Se Sn Sr Ta Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
76 43 47 11 82 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 13 23 78 52 66 10 24 19 27 70 49 80 48 57 71 28 31

Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit
$\text{CaC}_2\text{H}_2\text{O}_4 \cdot 3\text{H}_2\text{O}$	Calcium malate	R	Bi	+		Very large	Ax. pl. b(010); Z||a	(37)
$\text{CaC}_2\text{H}_2\text{O}_4 \cdot 3\text{H}_2\text{O}$	Calcium succinate	?	Bi			Very large	Ax. pl. b(010)	(37)
$\text{CaC}_2\text{H}_2\text{O}_4 \cdot 3\text{H}_2\text{O}$	Calcium mesotartarate	M	Bi	-(?)			Ax. pl. b(010)	(G, 37)
$\text{CaC}_2\text{H}_2\text{O}_4$	Calcium crotonate	(?)	Bi	-				(37)
$\text{CaC}_2\text{H}_2\text{O}_4 \cdot 6\text{H}_2\text{O}$	Calcium acid malate	R	Bi	+		100° 6' (red)	Ax. pl. a(100); Z||c	(G)
$\text{Ca}_2\text{C}_2\text{H}_2\text{O}_{11}$	Calcium aconitate	?	Bi			100° (apprx.)		(37)
$\text{Ca}_2\text{C}_2\text{H}_2\text{O}_{11} \cdot 4\text{H}_2\text{O}$	Calcium citrate	?	Bi					(37)
$\text{Ca}_2\text{C}_2\text{H}_2\text{O}_{11} \cdot 7\text{H}_2\text{O}$	Calcium nitrotetronate(?)	M	Bi		32° 26'		Ax. pl. \perp b(010); Z nearly \perp a(100)	(G)
$\text{Ca}_2\text{PbC}_2\text{H}_2\text{O}_{11}$	Dicalcium lead propionate	Tet	Un	+				(G)
$\text{CaPbC}_2\text{H}_2\text{O}_{11} \cdot 12\text{H}_2\text{O}$	Tetracalcium butyrate-pentalead propionate	C						(G)
$\text{CaCuC}_2\text{H}_2\text{O}_{11} \cdot 6\text{H}_2\text{O}$	Calcium cupric acetate	Tet	Un					(G)
78 $\text{SrC}_2\text{H}_2\text{O}_4$	Strontium formate	R	Bi	+	74° 14'	143° 36'	Ax. pl. a(100); Z||b	(G)
$\text{SrC}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	Strontium formate	R	Bi	-	66° 59.33'	114° 8'	Ax. pl. b(010), X||c	(G)
$\text{SrC}_2\text{H}_2\text{O}_4 \cdot 8\text{H}_2\text{O}$	Strontium disulfonate	M	Bi			Large	Ax. pl. \perp (010)	(4)
$\text{SrC}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	Strontium ethyl sulfate	M	Bi		75° 4'		Ax. pl. \perp b(010); Z||a = 70° in acute Z β	(G)
$\text{SrC}_2\text{H}_2\text{O}_4 \cdot \text{N}_2 \cdot 7\text{H}_2\text{O}$	Strontium nitrotetronate	M	Bi		30° 23'		Ax. pl. b(010); X \perp a(100)	(G)
$\text{Sr}_2\text{CuC}_2\text{H}_2\text{O}_{11}$	Strontium antimonyl tartrate	H	Un	-				(G)
$\text{Sr}_2\text{CuC}_2\text{H}_2\text{O}_{11} \cdot 8\text{H}_2\text{O}$	Cupric strontium formate	Tri	Bi		72° 4'			(L-B)
$\text{Sr}_2\text{Ca}_2\text{C}_2\text{H}_2\text{O}_{11}$	Dicalcium strontium propionate	Tet	Un	+				(G)
79 $\text{BaC}_2\text{H}_2\text{O}_4$	Barium formate	R	Bi	+	77° 54.33'		Ax. pl. b(010); Z||a	(G)
$\text{BaC}_2\text{H}_2\text{O}_4 \cdot 5\text{H}_2\text{O}$	Barium di-tartrate	M	Bi	+	93° 1'		Ax. pl. \perp b(010)	(G)
$\text{BaC}_2\text{H}_2\text{O}_4 \cdot \text{H}_2\text{O}$	Barium acetate	Tri	Bi					(18)
$\text{BaC}_2\text{H}_2\text{O}_4 \cdot \text{H}_2\text{O}$	Barium propionate	R	Bi	-	81° 36'		Ax. pl. a(100); X||b	(G)
$\text{BaC}_2\text{H}_2\text{O}_4 \cdot 7\text{H}_2\text{O}$	Barium d-galactonate	M	Bi			77° 37'	Ax. pl. \perp b(001); Z||b	(G)
$\text{BaC}_2\text{H}_2\text{O}_4 \cdot 11\text{H}_2\text{O}$	Barium methylacetate	R	Bi		88° 12'		Ax. pl. a(100), Z||b	(G)
$\text{BaC}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	Barium m-benzenedisulfonate	R	Bi		62° 19' (red)		Ax. pl. a(100); Z||c	(G)
$\text{BaC}_2\text{H}_2\text{O}_4 \cdot 4\text{H}_2\text{O}$	Barium phenol-2, 4-disulfonate	M	Bi	-	61° 58'		Ax. pl. ||a(100), X \perp c = 5° 20' in acute Z β	(G)
$\text{BaC}_2\text{H}_2\text{N}_4 \cdot 3.5\text{H}_2\text{O}$	Barium tetrazole	R	Bi			40° (apprx.)	Ax. pl. a(100); Z||c	(G)
$\text{BaC}_2\text{H}_2\text{O}_4 \cdot \text{N}_2 \cdot 3.5\text{H}_2\text{O}$	Barium dinitrophenol sulfonate	M	Bi	-		72° 13'	Ax. pl. b(010); X \perp c = 77° in acute Z β	(G)
$\text{BaC}_2\text{H}_2\text{O}_4 \cdot \text{N}_2 \cdot 2\text{H}_2\text{O}$	Barium methoxyammonate	M	Bi	+		40° (apprx.)	Ax. pl. b(010), Z \perp c = 8° in obtuse Z β	(G)
$\text{BaC}_2\text{H}_2\text{O}_4 \cdot \text{N}_4 \cdot 1.5\text{H}_2\text{O}$	Barium methylpyrazole carbonate	Tri	Bi		56° 42'		Ax. pl. \perp b(010)(apprx.)	(G)
$\text{BaC}_2\text{H}_2\text{O}_4 \cdot \text{P}_2 \cdot 2\text{H}_2\text{O}$	Barium diacetonephosphonate	R	Bi	+		122° 41'	Ax. pl. b(010), Z||c	(G)
$\text{BaC}_2\text{H}_2\text{O}_4 \cdot \text{N}_2 \cdot \text{S}_4$	Barium p-aminobenzophenone-p-sulfonate	M	Bi				Ax. pl. ||(010)	(4)
$\text{BaCdC}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	Barium cadmium formate	M	Bi	+	67° 36'	117°	Ax. pl. \perp b(010), Z \perp c = 46° 23' in acute Z β	(G)
$\text{Ba}_2\text{CuC}_2\text{H}_2\text{O}_{11}$	Barium copper formate	R	Bi	+		70°	Ax. pl. b(010)	(G)
$\text{Ba}_2\text{Ca}_2\text{C}_2\text{H}_2\text{O}_{11}$	Dicalcium barium propionate	C						(G)
81 $\text{LiC}_2\text{H}_2\text{O}_4 \cdot 5\text{H}_2\text{O}$	Monolithium malate	M	Bi	-		100°	Ax. pl. b(010)	(G)
$\text{LiC}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	Lithium naphthalene-1, 5-disulfonate	M	Bi		23°		Ax. pl. \perp (010)	(41)
$\text{LiC}_2\text{H}_2\text{O}_4 \cdot \text{N} \cdot \text{H}_2\text{O}$	Ammonium lithium tartrate	R	Bi	+	87° 6'			(G)
$\text{LiC}_2\text{H}_2\text{O}_4 \cdot \text{N} \cdot \text{H}_2\text{O}$	Lithium ammonium di-tartrate	M	Bi	+	81° 42'		Ax. pl. b(010); Z \perp c = 76.5° in obtuse Z β	(G)
$\text{LiTiC}_2\text{H}_2\text{O}_4 \cdot \text{H}_2\text{O}$	Lithium thallium tartrate	R	Bi	+		21° 40' (red)	Ax. pl. c(001)(red); Z||b	(G)
$\text{LiCr}_2\text{C}_2\text{O}_4 \cdot 18(?)\text{H}_2\text{O}$	Lithium chromic oxalate	R	Bi	-		95° 29'	Ax. pl. b(010); X||c	(G)
$\text{LiUO}_2\text{C}_2\text{H}_2\text{O}_4 \cdot 5\text{H}_2\text{O}$	Lithium uranyl acetate	M	Bi	-		65° 14'	Ax. pl. b(010); X \perp c = 12° in obtuse Z β	(G)
82 $\text{LiAlC}_2\text{H}_2\text{O}_4 \cdot 12\text{H}_2\text{O}$	Lithium aluminum oxalate	Tri	Bi	-		100° 30'	Ax. pl. \perp b(010)	(G)
$\text{NaC}_2\text{H}_2\text{O}_4 \cdot 3\text{H}_2\text{O}$	Sodium acetate	M	Bi	-	62° 50'		Ax. pl. \perp b(010); X \perp c = 44° in acute Z β	(G)
$\text{NaC}_2\text{H}_2\text{O}_4 \cdot \text{H}_2\text{O}$	Sodium acid malonate	R	Bi	-	39° 20'	55° 21'	Ax. pl. a(100), X||c	(G)
$\text{NaC}_2\text{H}_2\text{O}_4 \cdot \text{H}_2\text{O}$	Sodium di-tartrate	R	Bi	+	51° 31' (red)	83° 34' (red)	Ax. pl. a(100); Z||c	(G)
$\text{NaC}_2\text{H}_2\text{O}_4$	Sodium diacetate	C						(G)
$\text{NaC}_2\text{H}_2\text{O}_4$	Sodium citraconate	M	Bi	-	53° 25' (red)		Ax. pl. b(010)	(G)
$\text{NaC}_2\text{H}_2\text{O}_4$	Sodium acid phthalate	R	Bi			30° (apprx.)	Ax. pl. c(001)	(G)
$\text{NaC}_2\text{H}_2\text{O}_4 \cdot 3.5\text{H}_2\text{O}$	Sodium santonate	R	Bi	-		51° 46'	Ax. pl. a(100); X||b	(G)
$\text{NaC}_2\text{H}_2\text{O}_4 \cdot 3\text{H}_2\text{O}$	Sodium hydrosantonate	R	Bi	+		37° 24' (red)	Ax. pl. a(100); Z||c	(G)
$\text{NaC}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	Sodium p-phenolsulfonate	M	Bi	+	69° 58'	125° 47'	Ax. pl. b(010); Z \perp c = 9° in obtuse Z β	(G)
$\text{NaC}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	Sodium m-sulfobenzoate	Tri	Bi	-		86° 7'	X \perp b(010)	(G)
$\text{NaC}_2\text{H}_2\text{O}_4 \cdot \text{S}$	Sodium p-tylenesulfonate	R	Bi	-		27° 46'	Ax. pl. c(001); X||b	(G)
$\text{Na}_2\text{C}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	Sodium ethane disulfonate	M	Bi				Ax. pl. (010)	(4)
$\text{Na}_2\text{C}_2\text{H}_2\text{O}_4 \cdot \text{S}_2 \cdot 2\text{H}_2\text{O}$	Sodium naphthalene-1, 5-disulfonate	M	Bi	-	24° 0.5'		Ax. pl. \perp (010)	(41)
$\text{Na}_2\text{C}_2\text{H}_2\text{O}_4 \cdot \text{N}_2$	Sodium disomtransdimethane	M	Bi	-	89° 20'		Ax. pl. b(010); X \perp c = 43.66° in acute Z β	(G)

Ag Al As Au B Ba Be Bi Br C Ca Cl Cd Ce Dy Er Eu F Fe Ga Ge Gd Hg Hf Hs Ho I In Ir K La Li Lu Mn Mo Nb Ni Np O Os Pd Pt Pb Pr Rb Rh Ru S Se Sb Sn Sr Ta Te Th Ti Tl U V Vb W Y Zn Zr

CRYSTALLOGRAPHY

Formula	Name	System	Class	Sign	2V	2E	Orientation	Zh
$\text{NaC}_4\text{H}_4\text{O}_6 \cdot \text{H}_2\text{O}$	Sodium aspartate	M	Bi	—	—	31° 30'	Ax pl. b(010); $\angle \Lambda c = 51^\circ$ in acute $\angle \beta$	(G)
$\text{NaC}_4\text{H}_4\text{O}_6 \cdot \text{N}_2\text{H}_4\text{O}$	Sodium ammonium <i>d</i> -tartrate	M	Bi	—	44° 20'	—	Ax. pl. \perp b(010)	(G)
$\text{NaC}_4\text{H}_4\text{O}_6 \cdot \text{N}_2\text{H}_4\text{O}$	Sodium ammonium tartrate	R	Bi	—	50° 52'	90° 30'	Ax. pl. a(100); X||c	(G)
$\text{Na}_2\text{TiC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$	Sodium thallium tartrate	R	Bi	—	—	75° 49' 76° 47' (red)	Ax. pl. a(100); X||c	(G)
$\text{NaC}_4\text{H}_4\text{O}_6 \cdot \text{N}$	Sodium acid glutamate	M	Bi	—	63° 33'	—	Ax. pl. \perp b(010); $Z \perp \gamma(102)$	(G)
$\text{NaC}_4\text{H}_4\text{O}_6 \cdot \text{NS} \cdot 2\text{H}_2\text{O}$	Sodium sulfamate	R	Bi	+	63° 21'	115° 24'	Ax. pl. b(010); $Z \parallel c$	(G)
$\text{NaC}_4\text{H}_4\text{O}_6 \cdot \text{NS} \cdot 4\text{H}_2\text{O}$	Sodium naphthalenesulfonate (stable)	M	Bi	+	60° 10'	—	Ax. pl. b(010); $\angle \Lambda c = 3^\circ 35'$ in acute $\angle \beta$	(G)
$\text{Na}_2\text{TiC}_4\text{H}_4\text{O}_6$	Sodium trithallium tartrate	R	Bi	+	—	75° 40'	Ax. pl. c(001); $Z \parallel b$	(G)
$\text{Na}_2\text{CuC}_4\text{H}_4\text{O}_6 \cdot 9\text{H}_2\text{O}$	Sodium cupric triuranil acetate	M	Bi	+	—	90° 50'	Ax. pl. \perp b(010)	(G)
$\text{Na}_2\text{FeC}_4\text{H}_4\text{O}_6 \cdot 10\text{H}_2\text{O}$	Sodium ferrie oxalate	M	Bi	—	30° 0'	46° 53'	Ax. pl. b(010); $\angle \Lambda c = 12^\circ$ in obtuse $\angle \beta$	(G)
$\text{Na}_2\text{Cr}_2\text{C}_4\text{H}_4\text{O}_6 \cdot \text{N}_2 \cdot 7\text{H}_2\text{O}$	Sodium ammonium chronic oxalate	M	Bi	—	—	98° 20'	Ax. pl. \perp (010)	(G)
$\text{Na}_2\text{UC}_4\text{H}_4\text{O}_6$	Sodium uranyl acetate	C	—	—	—	—	—	(G)
$\text{Na}_2\text{MnC}_4\text{H}_4\text{O}_6 \cdot 9\text{H}_2\text{O}$	Sodium manganese triuranil acetate	M	Bi	—	—	105° 30'	Ax. pl. \perp b(010); $\angle \Lambda c = 70.5^\circ$ in obtuse $\angle \beta$	(G)
$\text{Na}_2\text{Al}_2\text{C}_4\text{H}_4\text{O}_6 \cdot \text{N}_2 \cdot 7\text{H}_2\text{O}$	Sodium ammonium aluminum oxalate	M	Bi	—	—	134°	Ax. pl. \perp b(010); $\angle \Lambda c = 76^\circ$ in obtuse $\angle \beta$	(G)
$\text{Na}_2\text{Al}_2\text{C}_4\text{H}_4\text{O}_6 \cdot \text{N}_2 \cdot 7\text{H}_2\text{O}$	Sodium ammonium aluminum oxalate	M	Bi	—	—	—	—	(G)
$\text{Na}_2\text{Al}_2\text{C}_4\text{H}_4\text{O}_6 \cdot 10\text{H}_2\text{O}$	Sodium aluminum oxalate	M	Bi	—	—	83° 30'	Ax. pl. b(010); $\angle \Lambda c = 7.5^\circ$ in obtuse $\angle \beta$	(G)
$\text{Na}_2\text{Al}_2\text{C}_4\text{H}_4\text{O}_6 \cdot \text{N}_2 \cdot 7\text{H}_2\text{O}$	Ammonium sodium aluminum oxalate	Tr	Bi	—	—	138°	Ax. pl. \perp (001); $Bx \perp$ (001)	(G)
$\text{Na}_2\text{LiC}_4\text{H}_4\text{O}_6 \cdot 2\text{H}_2\text{O}$	Sodium lithium <i>d</i> -tartrate	M	Bi	—	68° 57' (red)	—	Ax. pl. b(010); $\angle \Lambda c = 34.5^\circ$ in obtuse $\angle \beta$	(G)
83 $\text{K}_2\text{C}_4\text{H}_4\text{O}_6 \cdot \text{H}_2\text{O}$	Potassium oxalate	M	Bi	—	82°	150°	Ax. pl. b(010); $\angle \Lambda c = 40^\circ 45'$ in obtuse $\angle \beta$	(G)
$\text{KC}_4\text{H}_4\text{O}_6$	Potassium acid oxalate	M	Bi	—	40°	64°	Ax. pl. \perp b(010); $X \perp c(100)$	(G)
$\text{KC}_4\text{H}_4\text{O}_6 \cdot \text{H}_2\text{O}$	Potassium acid oxalate	R	Bi	—	—	75° 10'	Ax. pl. c(001); X||b	(G)
$\text{KC}_4\text{H}_4\text{O}_6$	Potassium acid succinate	M	Bi	—	—	113°	Ax. pl. \perp b(010)	(G)
$\text{KC}_4\text{H}_4\text{O}_6 \cdot 2\text{H}_2\text{O}$	Potassium acid succinate	R	Bi	—	—	—	Ax. pl. c(001); $Z \parallel a$	(G)
$\text{KC}_4\text{H}_4\text{O}_6$	Potassium acid tartrate	R	Bi	—	—	101° 10'	Ax. pl. c(001); X||b	(G)
$\text{KC}_4\text{H}_4\text{O}_6$	Potassium acid disuccinate	M	Bi	—	—	122° 50'	Ax. pl. \perp b(010); $\angle \Lambda c = 44^\circ$ in obtuse $\angle \beta$	(G)
$\text{K}_2\text{C}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$	Potassium tartrate	M	Bi	—	62°	102° 16' (red)	Ax. pl. \perp b(010)	(G)
$\text{K}_2\text{C}_4\text{H}_4\text{O}_6 \cdot 2\text{H}_2\text{O}$	Potassium <i>d</i> -tartrate	M	Bi	—	—	130° 2' (red)	—	(G)
$\text{K}_2\text{C}_4\text{H}_4\text{O}_6 \cdot 2\text{H}_2\text{O}$	Potassium tetroxalate	R	Bi	—	—	—	$Bx \perp$ (001)	(G)
$\text{KC}_4\text{H}_4\text{O}_6 \cdot 9\text{H}_2\text{O}$	Potassium mellitate	R	Bi	—	—	73° 30'	Ax. pl. b(010); X||c	(G)
$\text{KC}_4\text{H}_4\text{O}_6$	Potassium formyldehyde sulfite	M	Bi	+	—	98° 18'	Ax. pl. b(010)	(G)
$\text{KC}_4\text{H}_4\text{O}_6$	Potassium phenolsulfonate	R	Bi	+	69° 4' (approx)	—	Ax. pl. c(001); $Z \parallel b$	(G)
$\text{KC}_4\text{H}_4\text{O}_6 \cdot 2\text{H}_2\text{O}$	Potassium phenolsulfonate	R	Bi	+	—	—	Ax. pl. a(100); $Z \parallel c$	(G)
$\text{KC}_4\text{H}_4\text{O}_6$	Potassium phenylsulfate	R	Bi	+	—	87° 58'	Ax. pl. b(010); $Z \parallel c$	(G)
$\text{KC}_4\text{H}_4\text{O}_6 \cdot \text{H}_2\text{O}$	Potassium <i>p</i> -toluenesulfonate	R	Bi	—	67° 4'	—	Ax. pl. a(100); X||b	(G)
$\text{K}_2\text{CH}_4\text{O}_6$	Potassium methanesulfonate	M	Bi	—	72°	—	Ax. pl. \perp b(010); $\angle \Lambda c = 41^\circ$ in obtuse $\angle \beta$	(G)
$\text{K}_2\text{C}_4\text{H}_4\text{O}_6 \cdot \text{H}_2\text{O}$	Potassium <i>m</i> -benzenedisulfonate	M	Bi	—	—	96° (approx)	Ax. pl. \perp b(010)	(G)
$\text{K}_2\text{C}_4\text{H}_4\text{O}_6 \cdot \text{H}_2\text{O}$	Potassium phenoldisulfonate	R	Bi	—	65° 35'	—	Ax. pl. b(010); X||a	(G)
$\text{KC}_4\text{H}_4\text{O}_6\text{Cl}$	Potassium <i>p</i> -chlorobenzenesulfonate	M	Bi	—	81° 25' (red)	—	$Z \parallel b$	(G)
$\text{K}_2\text{C}_{12}\text{H}_4\text{O}_6 \cdot 2\text{H}_2\text{O}$	Potassium naphthalene-1, 5-disulfonate	M	Bi	—	34° 50'	—	Ax. pl. \perp (010); $\angle \Lambda c = 78^\circ$	(G)
$\text{KC}_4\text{H}_4\text{O}_6 \cdot \text{N}$	Potassium phthalimide	R	Bi	—	—	21° 2'	Ax. pl. b(010); X||a	(G)
$\text{KC}_4\text{H}_4\text{O}_6 \cdot \text{N}_2$	Potassium 3, 5-dinitrobenzoate	M	Bi	—	—	55° 25'	Ax. pl. b(010); $\angle \Lambda c = 65^\circ$ in acute $\angle \beta$	(G)
$\text{KC}_4\text{H}_4\text{O}_6 \cdot \text{N}_2$	Potassium picrate	R	Bi	—	33° 34'	67° 30'	Ax. pl. a(100); X||c	(G)
$\text{KC}_4\text{H}_4\text{O}_6$	Potassium acid uroamate	R	Bi	—	—	—	—	(G)
$\text{KC}_4\text{H}_4\text{O}_6 \cdot 8\text{H}_2\text{O}$	Potassium antimonyl tartrate	R	Bi	—	42° 34'	72° 30'	Ax. pl. c(001); X||b	(G)
$\text{K}_2\text{IrC}_4\text{O}_6 \cdot \text{Cl}_2 \cdot \text{H}_2\text{O}$	Potassium iridium chloroxalate	M	Bi	+	76° 23'	—	Ax. pl. b(010); $\angle \Lambda c = 13^\circ 53'$ in obtuse $\angle \beta$	(G)
$\text{K}_2\text{PtC}_4\text{O}_6 \cdot \text{N}_2 \cdot \text{H}_2\text{O}$	Potassium platinum nitrito oxalate	M	Bi	—	80° 40'	—	Ax. pl. \perp b(010)	(G)
$\text{K}_2\text{FeC}_4\text{O}_6 \cdot 6\text{H}_2\text{O}$	Potassium ferrie oxalate	M	Bi	—	80° 4' (red)	—	Ax. pl. b(010); $\angle \Lambda c = 1.25^\circ$ in obtuse $\angle \beta$	(G)
$\text{K}_2\text{NiC}_4\text{O}_6$	Potassium nickel dithioxalate	M	Bi	—	—	—	—	(G)
$\text{KCaC}_4\text{H}_4\text{O}_6 \cdot 8\text{H}_2\text{O}$	Calcium antimonyl tartrate potassium nitrate	R	Bi	—	—	64° 1'	Ax. pl. a(100); $Z \parallel b$	(G)
$\text{KLiC}_4\text{H}_4\text{O}_6 \cdot \text{H}_2\text{O}$	Lithium potassium ethanedisulfonate	M	Bi	—	—	82°	Ax. pl. (010); $Bx \perp$ (001) = 41° in obtuse $\angle \beta$	(G)
$\text{KLiC}_4\text{H}_4\text{O}_6 \cdot \text{H}_2\text{O}$	Lithium potassium tartrate	R	Bi	—	73° 58'	—	Ax. pl. b(010); X||a	(G)
$\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$	Sodium potassium tartrate	R	Bi	+	69° 40'	117° 2'	Ax. pl. b(010); $Z \parallel a$	(G)
$\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 8\text{H}_2\text{O}$	Potassium antimonyl tartrate sodium nitrate	R	Bi	—	—	90° 45'	Ax. pl. c(001); X||a	(G)
$\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 8\text{H}_2\text{O}$	Potassium antimonyl tartrate sodium nitrate	R	Bi	—	—	88° 37'	Ax. pl. b(010); X||c	(G)
$\text{K}_2\text{NaIrC}_4\text{O}_6 \cdot \text{Cl}_2 \cdot 2\text{H}_2\text{O}$	Potassium sodium iridium chloronitrito oxalate	R	Bi	+	—	63° 24'	Ax. pl. a(100); $Z \parallel b$	(G)

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pt Pr Ra Rb Rh Ru S Se Sn Sb Te Th Ti Tl Tm U V W Y Yb Zn Zr

78 42 47 11 82 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 82 66 10 24 19 27 70 49 50 48 57 71 38 21

Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit
84 $\text{Rb}_2\text{C}_4\text{H}_4\text{O}_4 \cdot 2\text{H}_2\text{O}$	Rubidium <i>dl</i> -tartrate	M	Bi	—	56° 6'		Ax. pl. b(010); $X \wedge c = 82^\circ 18'$ in acute $\angle \beta$	(G)
$\text{Rb}_2\text{C}_4\text{H}_4\text{O}_4 \cdot \text{H}_2\text{O}$	Rubidium mesotartrate	Tr	Bi	—	75° 18'		Ax. pl. 19° with <i>c</i> -axis	(G)
$\text{Rb}_2\text{Al}_2\text{C}_4\text{H}_4\text{O}_{10} \cdot 6\text{H}_2\text{O}$	Rubidium aluminum oxalate	M	Bi	—	80° 22'		Ax. pl. (010)	(G)
$\text{RbLi}_2\text{C}_4\text{H}_4\text{O}_4 \cdot \text{H}_2\text{O}$	Lithium rubidium tartrate	R	Bi	—	57° 10' (red)		Ax. pl. c(001); $X \parallel a$	(G)
$\text{Rb}_2\text{Na}_2\text{Cr}_2\text{C}_2\text{O}_8 \cdot 7\text{H}_2\text{O}$	Sodium rubidium chromic oxalate	M	Bi	—		56°	Ax. pl. b(010); $X \perp c(001)$	(G)
$\text{Rb}_2\text{Na}_2\text{Al}_2\text{C}_4\text{O}_{10} \cdot 23\text{H}_2\text{O}$	Sodium rubidium aluminum oxalate	M	Bi	—		24° 30'	Ax. pl. b(010); $X \perp (001)$	(G)

C-TABLE

Index No	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit
21	CHI_3	Iodoform	H	Un	—				(G)
55	CH_2ON_2	Urea	Tet	Un	—				(G)
58	$\text{CH}_3\text{N}_2\text{S}$	Thiourea	R	Bi	—		69° 51'–70° 59'	Ax. pl. a(001); $X \parallel b$	(G)
64.1	$\text{CH}_3\text{O}_2\text{As}$	Methyl arsenate	M	Bi	—	11° 21'		Ax. pl. $\perp b(010)$; $X \wedge c = 53^\circ 20'$ in acute $\angle \beta$	(G)
70	$\text{CH}_3\text{O}_2\text{N}_3$ $\text{CH}_3\text{O}_2\text{N}_3\text{S}$	Urea nitrate Ammonium methanesulfonate	M M	Bi Bi	— —	 79° 34'	23° 10'	Ax. pl. b(010), $X \perp c(001)$ Ax. pl. $\perp b(010)$, $X \wedge c = 39^\circ$ in obtuse $\angle \beta$	(G) (G)
84.1	$\text{C}_2\text{Cl}_2\text{Br}_2$	1, 2-Dibromo-1, 1, 2, 2-tetrachloroethane	R	Bi	—		87° 45'	Ax. pl. a(100); $X \parallel c$	(G)
87	C_2Br_4	Hexabromoethane	R	Bi	—		79° 30'	Ax. pl. a(100); $X \parallel c$	(G)
92	C_2Cl_4	Hexachloroethane	R	Bi	—		66° 28'	Ax. pl. a(100)	(G)
	$\text{C}_2\text{O}_2\text{N}_2\text{I}_2$	Diodiodoxane	R	Bi	—	63° 34'		Ax. pl. c(001); $Z \parallel a$	(G)
147	$\text{C}_2\text{H}_2\text{O}_4$	Oxalic acid	R	Bi	+			Ax. pl. c(001); $Z \parallel b$	(G)
	$\text{C}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	Oxalic acid	M	Bi	—	68°		Ax. pl. $\perp b(010)$, $X \parallel b$	(G)
161	$\text{C}_2\text{H}_3\text{O}_2\text{Cl}_2$	Chloral hydrate	M	Bi	—	20° 48'	35° (apprx)	Ax. pl. b(010); $X \wedge c = 58^\circ 45'$ in obtuse $\angle \beta$	(G)
238	$\text{C}_2\text{H}_5\text{ON}$	Acetamide (Unst. mod.)	?	Bi	—		120° (apprx)		(37)
238	$\text{C}_2\text{H}_5\text{ON}$	Acetamide (St. mod.)	Trig	Un	—				(G)
248	$\text{C}_2\text{H}_4\text{O}_2\text{N}_2 \cdot \text{H}_2\text{O}$	Ammonium hydrogen oxalate	R	Bi	—		22° 32'	Ax. pl. a(100); $X \parallel c$	(G)
	$\text{C}_2\text{H}_4\text{O}_2\text{N}_2\text{Cl}$	Glycocoll hydrochloride	R	Bi	—		63° 50'	Ax. pl. a(100); $X \parallel b$	(G)
303	$\text{C}_2\text{O}_2\text{H}_2\text{N}_2 \cdot \text{H}_2\text{O}$	Ammonium oxalate	R	Bi	—	61° 44'	110° 8'	Ax. pl. a(100); $X \parallel c$	(G)
306	$\text{C}_2\text{H}_2\text{N}_2\text{Cl}_2$	Ethylenediamine hydrochloride	M	Bi	—	81° 4'		Ax. pl. b(010); $X \wedge c = 6^\circ$ in acute $\angle \beta$	(G)
308.1	$\text{C}_2\text{N}_2\text{Cl}_2$	Cyanuric trichloride	M	Bi	—		28°	Ax. pl. $\perp b(010)$	(G)
313.1	$\text{C}_2\text{H}_3\text{O}_2\text{N}_2\text{Br}_2$	Dibromocyanacetamide	M	Bi	+		29° 52'	Ax. pl. $\perp b(010)$; $Z \wedge c = 31^\circ$ in obtuse $\angle \beta$	(G)
	$\text{C}_2\text{H}_2\text{N}_2\text{Cl}$	4-Chloropyrazole	R	Bi	+		100° (apprx)	Ax. pl. a(100)	(G)
	$\text{C}_2\text{H}_2\text{O}_2\text{Br}_2 \cdot \text{H}_2\text{O}$	Dibromopyrazoic acid	M	Bi	+		34° 9'	Ax. pl. $\perp b(010)$	(G)
	$\text{C}_2\text{H}_2\text{ON}_2\text{S}$	Pseudothiohydantoin	R	Bi	—		81° 30'	Ax. pl. a(100), $X \parallel b$	(G)
	$\text{C}_2\text{H}_2\text{O}_2\text{N}_2\text{S}$	Pyrazol-1-sulfonic acid	Tet	Un	—				(L-B)
486	$\text{C}_2\text{H}_2\text{O}_2\text{N}_2$	Malonamide (metast. mod.)	Tet	Un	—				(G)
444	$\text{C}_2\text{H}_2\text{O}_2\text{N}_4$	Ammonium fulminurate	M	Bi	—				(G)
	$\text{C}_2\text{H}_2\text{O}_2\text{N}$	β -Alanine	R	Bi	—		70° (apprx)	Ax. pl. c(001); $X \parallel b$	(G)
	$\text{C}_2\text{H}_2\text{N}_2\text{Br}$	Trimethyl ammonium bromide	M	Bi	+		50° (apprx)	Ax. pl. (010)	(G)
	$\text{C}_2\text{H}_2\text{N}_2\text{I}$	Trimethyl ammonium iodide	M	Bi	+		53° (apprx)	Ax. pl. (010)	(G)
535	$\text{C}_2\text{H}_2\text{O}_2\text{N}_2$	Guanidine carbonate	Tet	Un	—				(G)
	$\text{C}_2\text{H}_2\text{O}_2\text{N}_2\text{Br}_2$	Dibromosuccinimide	M	Bi	+		20° 50'	Ax. pl. b(010); $Z \wedge c = 8^\circ$ in obtuse $\angle \beta$	(G)
679.1	$\text{C}_2\text{H}_2\text{O}_2\text{N} \cdot 2\text{H}_2\text{O}$	Nitrotetronic acid	M	Bi	—			Ax. pl. b(010)	(G)
	$\text{C}_2\text{H}_2\text{O}_2\text{Br}_2$	<i>trans</i> - α , β -Dibromocrotonic acid	M	Bi	—		56° 1'	Ax. pl. $\perp b(010)$	(G)
	$\text{C}_2\text{H}_2\text{O}_2\text{N}_2$	Mesotartaric acid nitrile	M	Bi	+		50° (apprx.)		(G)
	$\text{C}_2\text{H}_2\text{O}_2\text{Cl}$	α -Chlorocrotonic acid	M	Bi	+		68° 17'	Ax. pl. $\perp b(010)$, $Z \wedge c = 35^\circ$ in obtuse $\angle \beta$	(G)
592	$\text{C}_2\text{H}_2\text{O}_2\text{N}(\text{St. mod.})$	Succinimide	R	Bi	—		90°	Ax. pl. (010); $B_{222} \perp (010)$	(28)
602	$\text{C}_2\text{H}_2\text{Br}_4$	Butadiene tetrabromide	R	Bi	+		57° (apprx)	Ax. pl. a(100); $Z \parallel c$	(G)
	$\text{C}_2\text{H}_2\text{O}_2\text{NCl}_2$	Ammonium trichloroisobutyrate	R	Bi	+		96°	Ax. pl. c(001)	(G)
	$\text{C}_2\text{H}_2\text{O}_2\text{N}_2\text{S}$	3-Methylpyrazole-1-sulfonic acid	M	Bi	—	53°	92°	Ax. pl. $\perp b(010)$; $Z \parallel b$	(G)
610	$\text{C}_2\text{H}_2\text{O}_2\text{N}_2$	Allantoin	H	Un	—				(21)
	$\text{C}_2\text{H}_2\text{O}_2\text{Se}$	Selenodiglycolic acid	M	Bi	—	78° 30'		Ax. pl. b(010); $Z \wedge c = 41^\circ$ in obtuse $\angle \beta$	(G)
640	$\text{C}_2\text{H}_2\text{O}_4 \cdot \text{H}_2\text{O}$	<i>dl</i> -Tartaric acid	Tr	Bi	—	67° 10'		Ax. pl. $\parallel p(110)$	(G)
	$\text{C}_2\text{H}_2\text{ON}$	<i>dl</i> -Aspartic acid	M	Bi	—	81° 44'		Ax. pl. $\perp b(010)$	(G)
	$\text{C}_2\text{H}_2\text{ON}$	Acetamide oxalate	R	Bi	—		25°	Ax. pl. a(100); $X \parallel c$	(G)
697.1	$\text{C}_2\text{H}_2\text{O}_2\text{Cl}_2$	Dichlorobutylene glycol	Trig	Un	—				(G)
	$\text{C}_2\text{H}_2\text{O}_2\text{NSb} \cdot \text{H}_2\text{O}$	Ammonium antimonyl tartrate	R	Bi	—		130° 46'	Ax. pl. c(001); $X \parallel b$	(G)
708	$\text{C}_2\text{H}_2\text{O}_2\text{N} \cdot \text{H}_2\text{O}$	Asparagine	R	Bi	+	1. 86° 40', d. 87° 16'		Ax. pl. b(010); $Z \parallel c$	(G)

Index No.	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
769	C ₄ H ₈ O ₄ N ₂	Tartramide	R	Bi	—	—	43° (apprx.)	Ax. pl. b(010); X||a	(G)
	C ₄ H ₈ O ₄ N	Ethylamine dioxalate	M	Bi	—	—	80° 20'	Ax. pl. b(010)	(G)
776	C ₄ H ₈ O ₄ N	Ammonium hydrogen malate	R	Bi	—	47° 54'	75° 24'	Ax. pl. b(010); X||c	(G)
778	C ₄ H ₈ O ₄ N	Ammonium hydrogen tartrate	R	Bi	—	79° 54'	—	Ax. pl. c(001); X||b	(G)
786	C ₄ H ₈ N ₄ O ₄	Guanidine lactate	R	Bi	+	70° 12'	—	Ax. pl. a(100); Z||b	(G)
788	C ₄ H ₁₀ N ₄ S ₂	Ethylenediamine thiocyanate	M	Bi	—	51°	89° 20'	Ax. pl. b(010); XΛc = 84° 30' in obtuse ∠β	(G)
808	C ₄ H ₁₂ O ₄	α-Erythrite	Tet	Un	—	—	—	—	(G)
	C ₄ H ₁₂ NI	Diethyl ammonium iodide	R	Bi	+	—	52° 15'	Ax. pl. (001); Z||a	(G)
	C ₄ H ₁₂ O ₄ N ₂	Ammonium malate	R	Bi	—	47° 34' (red)	—	—	(L-B)
835	C ₄ H ₁₂ O ₄ N ₂	Ammonium tartrate	M	Bi	—	39° 36'	64° 40'	Ax. pl. b(010); XΛc = 18° 41' in obtuse ∠β	(G)
835.1	C ₄ H ₁₂ O ₄ N ₂	Ammonium racemate	M	Bi	+	60° 54'	—	Ax. pl. b(010)	(G)
	C ₄ H ₁₂ O ₄ Cl	Chlorotartaric acid	R	Bi	+	46° 24'	75° 5'	Ax. pl. b(010); Z||c	(G)
	C ₄ H ₄ O ₄ N ₂ ·H ₂ O	Pyrazole dicarboxylic acid	M	Bi	—	77°	—	Ax. pl. ⊥b(010); Z appr. ⊥a(408)	(G)
868	C ₆ H ₆ O ₄	Aconic acid	R	Bi	—	—	—	Ax. pl. a(100); X||b	(G)
877	C ₆ H ₆ O ₄ N	Pyrolic-2-carboxylic acid	M	Bi	+	62° 7'	—	Ax. pl. b(010); ZΛn = 23° 45' in obtuse ∠β	(G)
	C ₆ H ₆ O ₄ N ₂	Urimidosuccinic acid	R	Bi	+	78° 14'	—	Ax. pl. a(100); Z||c	(G)
900	C ₆ H ₆ O ₄	Itaconic acid	R	Bi	+	—	67° 40' (red)	Ax. pl. b(010); Z||a	(G)
	C ₆ H ₆ O ₄ Br	Citrahonopropyltartaric acid	M	Bi	—	76°	—	Ax. pl. ⊥b(010); ZΛc = 62° in acute ∠β	(G)
	C ₆ H ₆ O ₄ N ₂	Urimidosuccinic acid amide	M	Bi	—	79° 35'	—	Ax. pl. b(010)	(G)
947.1	C ₆ H ₆ O ₄	Methyltetramic acid lactone	R	Bi	+	—	120° 10'	—	(14)
957	C ₆ H ₆ O ₄ ·H ₂ O	Methyl hydrogen d-tartrate	R	Bi	—	60° (apprx.)	—	Ax. pl. a(100); Z||c	(G)
	C ₆ H ₆ O ₄ Br	Bromohydroxyglutic acid	M	Bi	—	—	150°	—	(G)
	C ₆ H ₆ O ₄ N	Hydroxypiperidone	M	Bi	+	—	92° 33'	Ax. pl. ⊥b(010); Z nearly ⊥a(100)	(G)
975.1	C ₆ H ₆ O ₄ N	α-Acetylaminopropionic acid	R	Bi	—	36° 9'	—	Ax. pl. a(100); X||c	(G)
977	C ₆ H ₆ O ₄ N	d(β)-Glutamic acid	R	Bi	—	40° 27'	66° 35'	Ax. pl. b(010); X||a	(G)
988.1	C ₆ H ₆ O ₄ NCI	d(β)-Glutamic acid hydrochloride	R	Bi	+	70° 44'	—	Ax. pl. a(100); Z||b	(G)
994.1	C ₆ H ₆ O ₄ N ₂	Dimethylmalonamide	R	Bi	+	—	58° 27'	Ax. pl. b(001); Z||c	(G)
996	C ₆ H ₆ O ₄ N ₂	Amylene nitrosate	M	Bi	+	62° 65'	103° 53'	Ax. pl. ⊥b(010); ZΛc = 7° in obtuse ∠β	(G)
1035	C ₆ H ₁₂ O ₄	d-Tylose	M	Bi	—	—	—	Ax. pl. b(010)	(G)
1070.2	C ₆ H ₁₀ O ₄ N	Methyltetronamide	Not det.	Bi	+	—	Large 35° (apprx.)	—	(14)
	C ₆ H ₁₀ NBr	Piperidine hydrobromide	R	Bi	—	—	—	Ax. pl. b(010); Z||a	(G)
1075	C ₆ H ₁₀ NCI	Piperidine hydrochloride	R	Bi	—	—	52° 50'	Ax. pl. c(001); X||a	(G)
1093	C ₆ H ₁₀ O ₄	Pentaerythritol	Ditet	Un	—	—	—	—	(G)
	C ₆ H ₁₂ NBr ₂	Trimethyl-bromoethylammonium bromide	M	Bi	+	—	40° 2'	Ax. pl. ⊥(010); ZΛc = 30° 30' in acute ∠β	(G)
	C ₆ O ₄ N ₂ Br ₄	1, 2, 3, 5-Tetrabromodinitrobenzene	M	Bi	—	—	45° 54'	Ax. pl. b(010); X⊥r(201)	(G)
	CoCl ₂	β-Octachlorocyclohexenone	R	Bi	+	—	—	Ax. pl. b(010); Z||a	(G)
	CoCl ₂	γ-Octachlorocyclohexenone	M	Bi	—	37° 38'	65° 50'	Ax. pl. b(010); XΛc = about 93° in obtuse ∠β	(G)
1120	C ₆ HClO	Pentachlorophenol (β-mod.)	M	Bi	+	—	65° 23 5'	Ax. pl. ⊥b(010); ZΛc = 3° in acute ∠β	(G)
	C ₆ H ₃ O ₄ N ₂ Br ₂	1, 3-Dinitro-4, 6-dibromobenzene (St. mod.)	R	Bi	+	—	56° 52'	Ax. pl. a(100); Z||c	(G)
	C ₆ H ₃ O ₄ N ₂ Br ₂	1, 3-Dinitro-4, 6-dibromobenzene (metast. mod.)	R	Bi	—	—	73° 5'	Ax. pl. ⊥b(010); X⊥a(100)	(G)
	C ₆ H ₃ O ₄ N ₂ Br ₂	1, 2-Dinitro-4, 5-dibromobenzene	R	Bi	—	2H =	88° 22'	Ax. pl. a(100); X||c	(G)
	C ₆ H ₃ O ₄ N ₂ Br ₂	2, 4, 6-Tribromonitrobenzene	M	Bi	—	—	90° 15'	Ax. pl. ⊥b(010)	(G)
1142	C ₆ H ₃ O ₄ N ₂ I ₂	1, 3-Dinitro-2, 4-diodo-benzene	R	Bi	+	63° 26'	—	Ax. pl. a(100); Z||c	(G)
1149	C ₆ H ₃ O ₄ N ₂ Br	3-Bromo-1, 2-dinitrobenzene	R	Bi	+	51° 30' (red)	—	Ax. pl. b(010); Z||c	(G)
1155	C ₆ H ₃ O ₄ NBr ₂	3, 5-Dibromonitrobenzene	M	Bi	—	—	72° 19'	XΛc = 26° in obtuse ∠β	(G)
1155.1	C ₆ H ₃ O ₄ NBr ₂	Nitrodibromophenol	M	Bi	—	—	70° 73'	Ax. pl. ⊥b(010)	(G)
1163	C ₆ H ₃ O ₄ N ₂ Cl	4-Chloro-1, 2-dinitrobenzene	M	Bi	—	—	45° 31'	Ax. pl. ⊥b(010)	(G)
1165	C ₆ H ₃ O ₄ N ₂ Cl	α-4-Chloro-1, 3-dinitrobenzene (St. mod.)	R	Bi	—	—	102° 46' (red)	Ax. pl. b(010); Z||c	(G)
1165	C ₆ H ₃ O ₄ N ₂ Cl	α-4-Chloro-1, 3-dinitrobenzene (metast. mod.)	R	Bi	+	—	94° 15'	Ax. pl. a(100); Z||b	(G)
1174.1	C ₆ H ₃ O ₄ NCl ₂	4, 6-Dichloro-2-nitrophenol	M	Bi	—	—	62° 20'	—	(G)
	C ₆ H ₃ O ₄ NCl ₂	2, 6-Dichloro-4-nitrophenol	Tri	Bi	—	—	55° 30'	—	(G)
1200	C ₆ H ₃ O ₄ N ₄	Tetranitroaniline	M or Tri	Bi	—	—	120° (at least)	—	(27)
1216	C ₆ H ₃ O ₄ NCl	m-Chloronitrobenzene	R	Bi	—	—	91° 23'	Ax. pl. a(100); X||a	(G)
	C ₆ H ₃ O ₄ NSCl	p-Nitrobenzenesulfonyl chloride	M	Bi	—	—	65° (apprx.)	Ax. pl. b(010); XΛc = 33° 30' in obtuse ∠β	(G)
1243	C ₆ H ₃ O ₄ S ₂ Cl ₂	m-Benzenedisulfonyl chloride	M	Bi	—	—	80° 35'	Ax. pl. b(010); XΛc = 85° in obtuse ∠β	(G)

Index No.	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lat.
1274	C ₆ H ₄ O ₂ N ₂	2, 3-Dinitrophenol	M.	Bi.	+		16°	Ax. pl. \perp (010)	(19)
1277	C ₆ H ₄ O ₂ N ₂	2, 6-Dinitrophenol	R.	Bi.	+		95° 40'	Ax. pl. b(010); Z||a	(G)
1278	C ₆ H ₄ O ₂ N ₂	3, 4-Dinitrophenol	Tr.	Bi.			65°		(19)
1377	C ₆ H ₅ NBr	p-Bromaniline	R.	Bi.	+		28° 57.5'	Ax. pl. c(001); Z||a	(G)
	C ₆ H ₅ O ₂ NCl	Nicotinic acid hydrochloride	R.	Bi.	—		96° 22'	Ax. pl. a(100); X||c	(G)
	C ₆ H ₅ O ₂ NCl	Picolinic acid hydrochloride	R.	Bi.	—	41° 16'	73° 52'	Ax. pl. b(010); X||c	(G)
1384	C ₆ H ₅ Cl	α -trans-Benzenehexachloride	M.	Bi.	+		62° 2'	Ax. pl. b(010); Z \wedge c = 42° 25' in obtuse $\angle\beta$	(G)
	C ₆ H ₅ ON	Picolinamide	M.	Bi.	+		73° 20' (red)	Ax. pl. b(010)	(G)
	C ₆ H ₅ O ₂ N ₂	2-Methylpyranine-5-carboxylic acid	R.	Bi.			35° (apprx)	Ax. pl. a(100); Z||c	(G)
	C ₆ H ₅ O ₂ N ₂ S	p-Nitrobenzenesulfamide	M.	Bi.		59°		Ax. pl. b(010); Z \wedge c = 70° in acute $\angle\beta$	(G)
1412	C ₆ H ₅ O ₂ N ₄	Ammonium picrate	R.	Bi.	—		56°		(17)
1414	C ₆ H ₆ O ₂	α -Dihydroxybenzene	M.	Bi.	+		58° (apprx)	Ax. pl. \perp b(010); Z \wedge c = 6°-7°	(G)
1415	C ₆ H ₆ O ₂	Resorcinol	R.	Bi.	—	46° 14'	76° 6'	Ax. pl. c(001); X||a	(G)
1416	C ₆ H ₆ O ₂	Hydroquinone	Trag.	Un.					(G)
	C ₆ H ₆ O ₂ 2H ₂ O	Phloroglucinol	R.	Bi.	—		63° 49'	Ax. pl. c(001); X||a	(G)
	C ₆ H ₆ O ₂	α -Methyl- β -hydroxy- γ -pyrone (β -mod.)	R.	Bi.			Small	Ax. pl. a(001); Bx ₀ = b-axis	(19)
1448	C ₆ H ₇ ON	p-Aminophenol	R.	Bi.	—		47° 37'	Ax. pl. c(001); X||a	(G)
	C ₆ H ₇ O ₂ N ₂	Phenylsulfonhydroxamic acid	R.	Bi.	+		43° 20'	Ax. pl. c(001); Z||a	(G)
	C ₆ H ₇ NBr	Aniline hydrobromide	R.	Bi.	—		35°	Ax. pl. a(100)	(G)
	C ₆ H ₇ O ₂ Br ₄	Tetrabromocaproic acid	M.	Bi.	+		21° 52'	Ax. pl. \perp b(010); Z \wedge c = 100° in obtuse $\angle\beta$	(G)
	C ₆ H ₈ O ₂ N ₂ Cl ₂	1, 4-Dichloro-1, 4-dinitroscyclohexane	M.	Bi.	+	61° 58' (blue)	100° 15' (white)	Ax. pl. b(010); Z \wedge c = 40° 30' in acute $\angle\beta$	(G)
	C ₆ H ₈ O ₂ NCl ₂ 2H ₂ O	Ammonium trichlorodihydroxycyclopentane carboxylate	R.	Bi.			81° (apprx)	Ax. pl. (100)	(4)
	C ₆ H ₈ N ₂	2, 6-Dimethylpyrazine	M.	Bi.			86° (apprx)	Ax. pl. b(010); Z \wedge c = 20° in obtuse $\angle\beta$	(G)
1507	C ₆ H ₈ O ₂ H ₂ O	Citric acid	R.	Bi.	+	65° 42'	108° 40'	Ax. pl. a(100); Z||a	(G)
1523	C ₆ H ₈ O ₂ N ₂	Ammonium benzenesulfonate	R.	Bi.	+		33° 36'	Ax. pl. a(100); Z||c	(G)
	C ₆ H ₈ O ₂ N	Trimorpholine	M.	Bi.	+	80°		Ax. pl. b(010)	(G)
	C ₆ H ₈ O ₂ N	Acetamide dioxalate	Tr.	Bi.	—		69° 20'		(G)
	C ₆ H ₈ O ₂ Br ₂	Inosite dibromhydrin	R.	Bi.	+	67° 30'		Ax. pl. b(010); Z||a	(G)
	C ₆ H ₈ O ₂ Cl ₂ N ₂	Trimorpholine hydrochloride	M.	Bi.			50° 60'	Ax. pl. \perp b(010) (red)	(G)
1562	C ₆ H ₈ O ₂	Adipic acid	M.	Bi.	—		47° 30'	Ax. pl. b(010)	(G)
1563	C ₆ H ₈ O ₂	1, 1-Dimethylsuccinic acid	M.	Bi.		16° 12'	41° 28'	Bx ₀ nearly \perp (001), Ax. pl. (010)	(19)
	C ₆ H ₁₀ O ₂	1-Glycosan (1-Glucose anhydride)	R.	Bi.			71° 45'	Ax. pl. a(100); X||c	(G)
	C ₆ H ₁₀ O ₂	dl-Diacetic acid	R.	Bi.			65°	Ax. pl. ||(010), Bx ₀ \perp (001)	(17)
	C ₆ H ₁₀ O ₂	Diacetic acid	R.	Bi.	—		65° (apprx)	Ax. pl. b(010); X||c	(G)
	C ₆ H ₁₀ O ₂	Isomalturine	M.	Bi.	+		25° 19'	Ax. pl. \perp b(010), Z \wedge c = 63° 15' in obtuse $\angle\beta$	(G)
	C ₆ H ₁₀ O ₂ N	Acetamide dicitrate	M.	Bi.	—		70° 30'	Ax. pl. b(010), X \wedge c = 30° in acute $\angle\beta$	(G)
	C ₆ H ₁₀ O ₂ N ₂	Pyrolidone- α , α -dicarboxylic acid diamide	R.	Bi.	+		63° 30' (apprx)	Ax. pl. b(010), Z||c	(G)
	C ₆ H ₁₀ O ₂ N ₂ S ₂ H ₂ O	Ammonium phenol-2, 1(°)-disulfonate	M.	Bi.	+		113° 45'	Ax. pl. b(010); Z \wedge c = 23° 21' in obtuse $\angle\beta$	(G)
	C ₆ H ₁₀ O ₂	cis-o-Dihydroxyhexahydrobenzene	R.	Bi.	+		53° 10'	Ax. pl. b(010); Z||c	(G)
	C ₆ H ₁₀ O ₂	α -Methylxylolide	M.	Bi.	—	35° 14'	54° 55'	Ax. pl. b(010); X \wedge c = 30° in acute $\angle\beta$	(G)
1670	C ₆ H ₁₀ O ₂	d-Quercitol	M.	Bi.	+		58° 1'	Ax. pl. b(010); Z \wedge c = 11° 46' in acute $\angle\beta$	(G)
1672	C ₆ H ₁₂ O ₂ H ₂ O	β -D-glucosone	M.	Bi.	—	58° 5'		Ax. pl. b(010)	(G)
	C ₆ H ₁₂ O ₂ 2H ₂ O	d(l)-Inositol	R.	Bi.	+		42° 30'	Ax. pl. a(100); Z||c	(G)
	C ₆ H ₁₂ O ₂ 2H ₂ O	Dambosone ("meso"-inositol)	M.	Bi.	+		47° 20'	Ax. pl. \perp b(010); Z \wedge c = 17° in obtuse $\angle\beta$	(G)
	C ₆ H ₁₂ O ₂ N H ₂ O	Ammonium hydrogen ethoxysuccinate	R.	Bi.			20° (apprx)	Ax. pl. c(001); Z||b	(G)
	C ₆ H ₁₂ ON ₂	2-Propylantipyrine	M.	Bi.		52° 50'			(L-B)
	C ₆ H ₁₂ O ₂ S ₂ N ₂ Cl ₂	Cystine hydrochloride	M.	Bi.	+		3° 16'	Ax. pl. \perp b(010); Z \perp a(101)	(G)
1750	C ₆ H ₁₂ O ₂	Dulcitol	M.	Bi.	—		131° 10' (red)	Ax. pl. \perp b(010); X||b	(G)
1751	C ₆ H ₁₂ O ₂	d-Mannitol (α -mod.)	R.	Bi.	—		100° (apprx)	Ax. pl. c(001); X||b	(G)
1751	C ₆ H ₁₂ O ₂	d-Mannitol (β -mod.)	R.	Bi.	—		71° 30'	Ax. pl. a(100); X||b	(G)
1752.1	C ₆ H ₁₂ O ₂ 4H ₂ O	Sorbitol	M.	Bi.	—		100° (apprx)	Ax. pl. b(010); Z nearly \perp c(001)	(G)
1760.1	C ₆ H ₁₂ P ₂ S	Triethylphosphine sulfide	H.	Un.	+				(G)
	C ₆ H ₁₂ N ₂ Br ₂ H ₂ O	β -2, 5-Dimethylpiperazine hydrobromide	R.	Bi.	+		72° (apprx)	Ax. pl. a(100); Z||c	(G)
	C ₆ H ₁₂ NI	Dimethyl dimethyl ammonium iodide	R.	Bi.			82°	Z||c	(G)
	C ₆ H ₁₂ O ₂ Cl ₄	1-Methyl-1, 3, 3, 5, 5-pentachlorocyclohexan-2, 4, 6-trione	R.	Bi.	+		15° (apprx)	Ax. pl. a(100), Z||c	(G)

Index No.	Formula	Name	System	Class	Sign	2A	2E	Orientation	Lit.
1789	C ₇ H ₃ O ₄ N ₃	2, 4, 6-Trinitrobenzoic acid	R	Bi	+		84° 36'	Ax. pl. c(001); Z||b	(G)
	C ₇ H ₃ O ₄ Cl ₃	3, 5-Dichlorosalicylic acid	R	Bi	+		29° 15'	Ax. pl. b(010); Z||c	(G)
1835	C ₇ H ₃ O ₄ N ₃	2, 4-Dinitrobenzoic acid	M	Bi	-		18°	Ax. pl. (010); Bxa nearly ⊥(01)	(11)
1837	C ₇ H ₃ O ₄ N ₃	2, 6-Dinitrobenzoic acid	R	Bi	+		103°	Ax. pl. (100); Bxa ⊥(010)	(11)
1839	C ₇ H ₃ O ₄ N ₃	3, 5-Dinitrobenzoic acid	M	Bi	-		80° 16'	Ax. pl. b(010); X∧c = 48° in acute ∠β	(G)
	C ₇ H ₃ O ₄	Chelidonic acid	M	Bi	-		40°	Ax. pl. ⊥b(010); X nearly ||c(101)	(G)
1843	C ₇ H ₃ O ₄ ·3H ₂ O	Meconic acid	R	Bi	-		48° 53'	Ax. pl. b(010); X||c	(G)
1881	C ₇ H ₃ O ₄ I	o-Iodobenzoic acid	M	Bi	-		70°	Ax. pl. ⊥b(010); Bxa ||c-axis	(G)
1903	C ₇ H ₃ O ₄ N·2H ₂ O	Dipicolinic acid	R	Bi	-		99°	Ax. pl. (001); Bx ⊥(010)	(12)
1909	C ₇ H ₃ O ₄ N	5-Nitro-2-hydroxybenzoic acid	M	Bi	+		105° 38'	Ax. pl. a(100); X||c	(G)
1977	C ₇ H ₃ N ₃	Benzimidazol	R	Bi	+	80° 45'		Ax. pl. c(001); Z||b	(G)
1979	C ₇ H ₃ N ₃	Indazole	M	Bi	+	50°		Ax. pl. b(010); Z∧c = 18° in obtuse ∠β	(G)
						(apprx)		Ax. pl. ⊥b(010); X∧c = 32° in acute ∠β	(G)
1985	C ₇ H ₃ O ₄ N ₃	2, 4-Dinitrotoluene	M	Bi	-			Ax. pl. a(100); X||c	(G)
1987	C ₇ H ₃ O ₄ N ₃	2, 6-Dinitrotoluene	R	Bi	-		98° 4'	Ax. pl. ⊥b(010)	(G)
1989	C ₇ H ₃ O ₄ N ₃	3, 5-Dinitrotoluene	M	Bi	-			Ax. pl. a(100); Z||c	(G)
	C ₇ H ₃ O ₄ N ₃ ·H ₂ O	o-Phenylhydroxytetrazole	R	Bi	-	60° 70'		Ax. pl. a(100); Z||c	(G)
2074	C ₇ H ₃ O ₄ N	Anthranic acid	R	Bi	-		78° 30' (11a, yellow)	Ax. pl. c(001); Z||a; Bxa ⊥(100)	(G)
	C ₇ H ₃ O ₄ N	Benzohydroxamic acid	R	Bi	+		50° 2'	Ax. pl. a(100); Z||b	(G)
	C ₇ H ₃ O ₄ N·H ₂ O	Pyridinebetaine	M	Bi	-	25° 16'		Ax. pl. b(010); X∧c = 12° 45' in obtuse ∠β	(G)
	C ₇ H ₃ O ₄ N ₃	3, 5-Dinitro-p-toluidine	R	Bi	-		100°	Ax. pl. a(100); Z||b	(G)
	C ₇ H ₃ O ₄ NCl	Isobenzaldoxime hydrochloride	R	Bi	-		(apprx)	Ax. pl. a(100); Z||b	(G)
	C ₇ H ₃ O ₄ NCl	Pyridinebetaine hydrochloride	M	Bi	+	52° 3'	88° 8'	Ax. pl. ⊥b(010); Z∧c = 27° in acute ∠β	(G)
	C ₇ H ₃ O ₄ N ₃ ·H ₂ O	Benzoylamidine nitrate	M (?)	Bi	-		78° 55'	Ax. pl. ||d(010)	(G)
2174	C ₇ H ₃ O ₄	Guaiacol	Trig	Un	-				(G)
2185	C ₇ H ₃ O ₄	Hydrochelidonic anhydride	R	Bi	-		120°	Ax. pl. c(001); X||a	(G)
	C ₇ H ₃ O ₄ Br	Bromo-shikimic acid	R	Un	-		(apprx)		(G)
	C ₇ H ₃ N ₃ Cl·2H ₂ O	Benzoylamidine hydrochloride	R	Bi	-		35°	Ax. pl. a(100); Z||c	(G)
	C ₇ H ₃ O ₄ Cl·2H ₂ O	α, α-Dimethyl-γ-pyrone hydrochloride	R	Bi	-		90°	Ax. pl. a(100); X||b	(G)
	C ₇ H ₃ O ₄ N	3-Amino-p-cresol	R	Bi	+		44° 40'	Ax. pl. a(100); Z||c	(G)
	C ₇ H ₃ O ₄ N·3H ₂ O	2, 6-Dimethyl-4-hydroxypyridine	M	Bi	+		110° 41'	Ax. pl. b(010)	(G)
2225	C ₇ H ₃ O ₄ N	Ammonium benzoate	R	Bi	+		67°	Ax. pl. a(100); Z||c	(G)
2233	C ₇ H ₃ O ₄ N ₃	p-Toluidine-2-sulfonic acid	M	Bi	+		87° 54'	Ax. pl. b(010); Z∧c = 8° in obtuse ∠β	(G)
2234.1	C ₇ H ₃ O ₄ N ₃	Ammonium o-sulfobenzoate	R	Bi	-	53° 29'	84° 30'	Ax. pl. b(010); X||a	(G)
	C ₇ H ₃ N ₃ Br	Toluidine hydrobromide	R	Bi	-	82° 37'		Ax. pl. c(001); X||b	(G)
	C ₇ H ₃ O ₄ Br ₂	Dibromotrihydroxy tetrahydrobenzoic acid	R	Bi	+	76° 32'		Ax. pl. c(001)	(G)
2260.1	C ₇ H ₃ O ₄ N ₃	Mono-urendihydroxy dimethyl succinate	R	Bi	-	72° 15 5'		Ax. pl. b(010); Z||c	(G)
2260.2	C ₇ H ₃ O ₄ N ₃	Isotetrahydroxydimethylurea	M	Bi	+	40° 0 5'	62° 34 25'	Ax. pl. ⊥b(010); Z∧c = 2° 15' in acute ∠β	(G)
	C ₇ H ₃ O ₄ N ₃ ·2H ₂ O	2, 4-Tolnylendiamine sulfate	M	Bi	-		100°		(G)
	C ₇ H ₃ O ₄	Trimethyl succinic acid	R	Bi	-	84° 11'		Ax. pl. (100); Bxa ⊥(001)	(12)
	C ₇ H ₃ O ₄	l-Methylmannoside	R	Bi	-	36° 11'	57° 8'	Ax. pl. b(010); X||c	(G)
	C ₇ H ₃ O ₄	α-Methylmannoside	R	Bi	+	46° 58'	75°	Ax. pl. b(010); Z||a	(G)
2372	C ₇ H ₃ O ₄	α-Methylglucoside	R	Bi	+	85° 18'		Ax. pl. b(010); Z||c	(G)
2373	C ₇ H ₃ O ₄	β-Methylglucoside	Tet	Un	-				(G)
	C ₇ H ₃ O ₄ ·H ₂ O	dl-α-Methylgalactoside	R	Bi	+	53° 5'	85° 45'	Ax. pl. a(100); Z||c	(G)
	C ₇ H ₃ O ₄ N ₃ Cl ₃	2, 4, 6-Trichloro-3-nitrobenzoic acid methyl nitramide	M	Bi	-		42°	Ax. pl. ⊥b(010); X∧c = 69° in acute ∠β	(G)
	C ₇ H ₃ O ₄ N	Isatoic acid anhydride	M	Bi	-		90°	Ax. pl. ⊥b(010)	(G)
							(apprx)		(G)
2452	C ₇ H ₃ O ₄ N	Phthaloxime	M	Bi	-				(12)
	C ₇ H ₃ N ₃ Br	Bromobenzyl cyanide	Trig	Un	-				(L-B)
	C ₇ H ₃ O ₄ N ₃ Br	1-Nitro-3-bromo-4-acetanilide (S-mod)	M	Bi	-		124° 10'	Ax. pl. ⊥b(010)	(G)
	C ₇ H ₃ O ₄ Cl ₃	Tetrachlorophloroglucinol dimethyl ether	R	Bi	+		90°	Ax. pl. a(100)	(G)
							(apprx)		(G)
	C ₇ H ₃ O ₄ N ₃ Br	Nitrobromacetanilide (α-mod)	M	Bi	-		124° 10'	Ax. pl. ⊥(010); Bxa nearly ⊥(001)	(1)
	C ₇ H ₃ O ₄ NCl ₂	Dichloroacetanilide	M	Bi	+	83° 35'		Ax. pl. ⊥b(010); Z∧c = 61° in obtuse ∠β	(G)
2536	C ₇ H ₃ O ₄ N ₃	2, 3, 6-Trinitro-p-xylene	M	Bi	-	61° 32'		Ax. pl. b(010); X∧c = 28° in obtuse ∠β	(G)

Index No	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
			R	Bi	—	74° 48'	27° 41'	Ax. pl. c(001); Z b	(G)
	<chem>CdH4ONCl</chem>	Methylphenylurea chloride	Tri	Bi	—		80°	Ax. pl. ⊥ b-axis	(G)
2556	<chem>CdH4ON4</chem>	Methoxyphenyltetrazole	M	Bi	—		(apprx.)	Ax. pl. ⊥ b(010)	(G)
	<chem>CdH4O4N4</chem>	m-Nitroacetamide					105° 8'	Ax. pl. ⊥ b(010)	(G)
2564	<chem>CdH4O4N4</chem>	2, 3-Dinitro-p-xylene	M	Bi	+		53°	Ax. pl. b(010); Z a	(21)
	<chem>CdH4O4N4</chem>	9-Allylurea acid	Un				(apprx.)		(G)
	<chem>CdH4O4</chem>	Hematin acid anhydride	R	Bi	+		120° 10'	Ax. pl. a(100); X c	(G)
	<chem>CdH4O6</chem>	Acetyluric anhydride	R	Bi	—	71° 2'		Ax. pl. ⊥ b(010); ZΛ c =	(G)
	<chem>CdH4N4Cl·H2O</chem>	Phenylaminotetrazolone hydrochloride	M	Bi	+		110°	44° in acute Zβ	(G)
	<chem>CdH4O4SCl</chem>	Chloromethyl p-tolyl sulfone	R	Bi	+		(apprx.)	Ax. pl. b(010); Z c	(G)
2649	<chem>CdH4ON</chem>	Acetamide	R	Bi	+	88° 36'	90°	Ax. pl. b(010); Z c	(G)
2657	<chem>CdH4ON</chem>	p-Acetaminophenol	M	Bi	—		31°	Ax. pl. ⊥ b(010); X b	(G)
2681	<chem>CdH4O4N</chem>	Isulverdic acid	M	Bi	—		(apprx.)	Ax. pl. ⊥ b(010); XΛ c =	(G)
	<chem>CdH4O4N4</chem>	2, 4-Dinitrodimethylamine	R	Bi	—		23° 30'	Ax. pl. c(001); X a	(G)
	<chem>CdH4O4NCl</chem>	Phenylglycine hydrochloride	R	Bi	—	18° 9'	53° 47'	Ax. pl. b(010); X a	(G)
	<chem>CdH4O4</chem>	p-Hydroxyphenyl ethyl alcohol (Tyrosol)	R	Bi	—		84° 30'	Ax. pl. ⊥ b(010)	(G)
	<chem>CdH4O4</chem>	Dimethylpyrogallol	M	Bi	+		55° 19'	Ax. pl. b(010); X a	(G)
	<chem>CdH4N4Br</chem>	Xyldine hydrobromide	R	Bi	—		62° 15'	Ax. pl. (100); BxΛ ⊥ (001)	(22)
	<chem>CdH4O4NBr</chem>	Tetramethylsuccinic bromolamide	R	Bi	—		(Hq, yellow)		
	<chem>CdH4O4NCl</chem>	Tetramethylsuccinic chloramide	R	Bi	—		47° 20'	Ax. pl. (010); BxΛ ⊥ (001)	(22)
	<chem>CdH4O4NCl</chem>	Vanillylamine hydrochloride	M	Bi	—		70°		(23)
	<chem>CdH4N4</chem>	Ethylamine hydroiodide	R	Bi	—		65°	Ax. pl. a(100); X c	(G)
2808	<chem>CdH4O4N4</chem>	Tetraacetylhydrazine	R	Bi	+	17° 5'	70° 33'	Ax. pl. c(001); Z b	(G)
	<chem>CdH4O4</chem>	trans-Hexahydroterephthalic acid	M	Bi	—		65°	Ax. pl. ⊥ b(010)	(G)
	<chem>CdH4O4</chem>	Norpine acid	M	Bi	+		7°	Ax. pl. ⊥ b(010)	(G)
	<chem>CdH4O4</chem>	Isopropylisoparacoumaric acid	M	Bi	+		(apprx.)		
	<chem>CdH4O4N4</chem>	Lysidine d-tartrate	M	Bi	—	80° 1'	51° 12'	Ax. pl. ⊥ b(010); ZΛ c =	(G)
	<chem>CdH4O4N4S8Br·H2O</chem>	Ammonium antimonyl tartrate	R	Bi	—	68° 8'		83° in obtuse Zβ	(G)
2915	<chem>CdH4O4</chem>	Metaldihyde	Tet	Un				Ax. pl. b(010); XΛ c = 30°	(G)
2916	<chem>CdH4O4</chem>	bis-Methoxyacetol	M	Bi	—			in obtuse Zβ	(L-B)
2920	<chem>CdH4O4</chem>	d, α-Ethyl glycoside	R	Bi	—	51° 14'	94° 40'	Ax. pl. b(010); X a	(G)
	<chem>CdH4N4Cl</chem>	1, 4-Dimethyl-5-isopropylpyrazoline hydrochloride	M	Bi	—	50°		Ax. pl. b(010); XΛ c = 21°	(G)
	<chem>CdH4N4Cl</chem>	Isobutyraldazine hydrochloride	M	Bi	—	56°	94° 41'	21° in obtuse Zβ	(G)
2945	<chem>CdH4NBr</chem>	d-Comine hydrobromide	R	Bi	+		45° 50'	Ax. pl. b(010); X c	(G)
2946	<chem>CdH4NCl</chem>	d-Comine hydrochloride	R	Bi	+		20° 0'	Ax. pl. c(001); Z b	(G)
2948	<chem>CdH4N4</chem>	d-Comine hydroiodide	M	Bi	—		107° 30'	Ax. pl. b(010)	(G)
	<chem>CdH4P4I</chem>	Tetraethyl phosphonium iodide	Trig	Un			(apprx.)		(G)
	<chem>CdH4OBr2</chem>	Dibromohydrindone	R	Bi	—		36° 29'	Ax. pl. b(010); X a	(G)
	<chem>CdH4OBr2</chem>	Phenyl-α-bromocroton	R	Bi	+		39°	Ax. pl. b(010); Z c	(G)
	<chem>CdH4OCl</chem>	Phenyl-α-chlorocroton	R	Bi	+		22°	Ax. pl. a(100); Z c	(G)
	<chem>CdH4OBr2</chem>	Phenylbromopropionic acid	M	Bi	+		57°	Ax. pl. ⊥ b(010)	(G)
3090	<chem>CdH4O4Cl2</chem>	Ethyl dichlorosuccinate	R	Bi	—			(apprx.)	
	<chem>CdH4N4</chem>	3-Aminoquinoline	R	Bi	—		45°	Ax. pl. b(010); X c	(G)
	<chem>CdH4O4</chem>	Acetylsuccinic acid	Tri	Bi	—	Small		Ax. pl. c(001); X b	(G)
	<chem>CdH4O4N4</chem>	Pentaerythritol nitrate	Tet	Un				Sections ⊥ BxΛ; elongation = Z	(42)
	<chem>CdH4O4N4Br</chem>	Bromodinitromesitylene	M	Bi	—	12° 19'	88° 13'	Ax. pl. ⊥ b(010); X b	(19)
	<chem>CdH4Br2</chem>	Tribromomesitylene	Tri	Bi	—		24° 3'		(G)
	<chem>CdH4O4Cl2</chem>	1, 3, 5-Trimethyl-1, 3, 5-trichlorocyclohexan-2, 4, 6-trione	M	Bi	—		60°	Ax. pl. b(010)	(G)
3103	<chem>CdH4ON</chem>	Hydrocarbostyril	R	Bi	—		(apprx.)	Ax. pl. a(100); X c	(G)
	<chem>CdH4O4N</chem>	Benzoylacetylhydroxamic acid	M	Bi	—	47° 10'		Ax. pl. ⊥ b(010); XΛ c =	(G)
3111	<chem>CdH4O4N</chem>	Hippuric acid	R	Bi	+	65° 49'		86° in acute Zβ	(G)
	<chem>CdH4O4N4</chem>	1-Phenyl-3-methylpyrazolone	R	Bi	—		64° (red)	Ax. pl. c(001)	(G)
	<chem>CdH4O4N4</chem>	Isomitosamylacetone	R	Bi	—		41° 40'	Ax. pl. b(010); X c	(G)
	<chem>CdH4O4N4</chem>	Dinitromesitylene	R	Bi	—		50°	Ax. pl. a(100); X c	(G)
	<chem>CdH4O4</chem>	D hydroxyacetyllevulinic acid	M	Bi	+	74° 45'	(apprx.)	Ax. pl. b(010); ZΛ c = 5°	(G)

Index No.	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
3177	C ₈ H ₁₀ O ₄	<i>d</i> (l)-Phenylglyceric acid	M.	Bi	+		19°	Ax. pl. b(010); $\Sigma \wedge c = 47^\circ$ in acute $\angle \beta$	(G)
3178	C ₈ H ₁₀ O ₄	<i>dl</i> -Phenylglyceric acid	M.	Bi.			19°	Ax. pl. (010)	(19)
3179	C ₈ H ₁₀ O ₄	<i>d</i> (l)- <i>p</i> -Methoxymandelic acid	M.	Bi			76° 30' (apprx)	Ax. pl. b(010)	(G)
	C ₈ H ₁₁ O ₄ Br ₂	Tribromomaleic anhydride	R.	Bi.	+		75° (apprx)	Ax. pl. a(100); Σ || c	(G)
	C ₈ H ₁₁ O ₄ Cl	β -Anhydrocamphoronyl chloride	R.	Bi	+		75° (apprx)	Ax. pl. c(001); Σ || c	(G)
3194	C ₈ H ₁₁ ON	<i>o</i> -Acetotoluidide	R	Bi		58° 28'		Ax. pl. b(010); Σ || a	(G)
3196	C ₈ H ₁₁ ON	<i>p</i> -Acetotoluidide	M	Bi	+	88° 30'		Ax. pl. b(010)	(G)
3199	C ₈ H ₁₁ ON	<i>N</i> -Methylacetanilide	R	Bi	+	51° 41'	87° 8'	Ax. pl. b(010); Σ || c	(G)
	C ₈ H ₁₁ O ₂ N	Methyl <i>p</i> -toluohydroxamic acid	M	Bi				Ax. pl. \perp b(010); $X || b$	(G)
	C ₈ H ₁₁ O ₂ N	Phenyl- β -aminopropionic acid	M	Bi	+		77° 37'	Ax. pl. \perp b(010); $\Sigma \wedge c = 54^\circ$ in obtuse $\angle \beta$	(G)
3220	C ₈ H ₁₁ O ₂ N	Nitrobenzylidene	R	Bi			66° 32'	Ax. pl. a(100); Σ || c	(G)
	C ₈ H ₁₁ O ₂ N ₂	ω -Methyl- ω -phenyl lauret	M	Un					(8,9)
	C ₈ H ₁₁ O ₂ N ₂ ·H ₂ O	Tetrahydroquinoline-5-carboxylic acid (8 π mod.)	R	Bi.			110° 39' (apprx)	Ax. pl. b(010); Σ || a	(G)
	C ₈ H ₁₁ ON ₂	Benzenylammonium ethyl ether	R.	Bi		83° 21'		Ax. pl. c(001); Σ || a	(G)
	C ₈ H ₁₁ O ₂ N ₂ ·H ₂ O	Benzenylamine acetate	M	Bi	+		53° 59'	Ax. pl. b(010); $\Sigma \wedge c = 15^\circ$ in obtuse $\angle \beta$	(G)
3232	C ₈ H ₁₇ O ₄ N ₄	1, 3, 7, 9-Tetramethylureic acid	M.	Bi	+	75° 19'		Ax. pl. \perp b(010); $\Sigma \wedge c = 10^\circ$ in acute $\angle \beta$	(G)
	C ₈ H ₁₇ O ₄ S	Ethyl- <i>p</i> -tolyl sulfone	R	Bi		81°		Σ || c	(G)
	C ₈ H ₁₇ O ₄ S	<i>n</i> -Propylphenyl sulfone	M	Bi	+		30° 10'	Ax. pl. h(010); $\Sigma \wedge c = 0^\circ$ in obtuse $\angle \beta$	(G)
	C ₈ H ₁₇ O ₄ ·3H ₂ O	Trimethylphloroglucinol	M	Bi			80° (apprx)	Ax. pl. b(010); $X \perp c(001)$	(G)
3251	C ₉ H ₁₃ O ₄	Pyrogallol trimethyl ether	R	Bi			80° (apprx)	Ax. pl. b(010); Σ || c	(G)
	C ₉ H ₁₃ O ₄	Anhydrocamphoric acid	R	Bi.	+		70° (apprx)	Ax. pl. b(010); Σ || c	(G)
	C ₉ H ₁₃ O ₄	Methanetetraacetic acid	Tet	Un					(19)
	C ₉ H ₁₃ NBr ₂ Cl	<i>m</i> -Chlorophenyltrimethyl ammonium bromide	R	Bi	+		3° 35'	Ax. pl. a(100); $X || c$	(G)
	C ₉ H ₁₃ NCl ₂	<i>m</i> -Chlorophenyltrimethyl ammonium chloride	R	Bi			24° 50'	Ax. pl. b(010); $X || c$	(G)
	C ₉ H ₁₃ O ₄ N ₂	Tetrahydroquinoline sulfate	M	Bi			71° 2'		(G)
	C ₉ H ₁₃ O ₄ N ₂	Nitrodiaminomestylene	M	Bi.	+		40° (apprx)	Ax. pl. b(010)	(G)
	C ₉ H ₁₃ O ₄ N ₂	<i>m</i> -Nitrophenyltrimethyl ammonium nitrate	R	Bi			43° 7'	Ax. pl. c(100); Σ || c	(G)
	C ₉ H ₁₃ O ₄ N ₂	Tyrosine sulfate	M	Bi.			80°	Ax. pl. b(010)	(G)
	C ₉ H ₁₃ O ₄ NCl	Veratryl amine hydrochloride	M	Bi	—		About 60°		(11)
	C ₉ H ₁₃ O ₄ N ₂	Mono- α -naphthyl diethyl succinate	R	Bi		84° 15'		Ax. pl. h(010); Σ || c	(G)
	C ₉ H ₁₃ O ₄	β -Oxyanaphthoric acid (?)	M	Bi	+	80° 17'		Ax. pl. b(010); $\Sigma \wedge c = 41^\circ$ 45' in obtuse $\angle \beta$	(G)
3293	C ₉ H ₁₃ ON	<i>N</i> -Methylgranatamine	R	Bi	+		78° 40' (apprx)	Ax. pl. b(010); Σ || c	(G)
	C ₉ H ₁₃ O ₂ N·H ₂ O	l-Ergonine	M	Bi.			70° (apprx)	Ax. pl. \perp b(010)	(G)
	C ₉ H ₁₃ O ₂ N	α -Aminoethylidene diethyl succinate	R	Bi			83° 53'	Ax. pl. b(010); Σ || a	(G)
	C ₉ H ₁₃ O ₂ N ₂ ·2H ₂ O	Ergothionine hydrochloride	R	Bi.	—		70°	Ax. pl. c(001); $X || b$	(G)
	C ₉ H ₁₃ O ₂ N ₂ ·2H ₂ O	Ergothionine hydronitride	R	Bi.	+		70° (apprx)	Ax. pl. b(010); Σ || a	(G)
	C ₉ H ₁₃ O ₂	3, 3, 5-Trimethylhexan-ol-olol	R	Bi	—	57° 16'	93° 14'	Ax. pl. c(001); $X || a$	(G)
	C ₉ H ₁₃ O ₂ N ₂	<i>N</i> -Methylpyrrolidine- α , α -dicarboxymethylamide	M	Bi	—		110° (apprx)	Ax. pl. b(010)	(G)
3344	C ₉ H ₁₄ O ₇	Galactite	R	Bi.	—	69° 46'		Ax. pl. h(010); $X || a$	(G)
	C ₁₀ H ₈ OCl ₄	Hexachloro- α -ketohydronaphthalene	M	Bi	—	71° 44'		Ax. pl. \perp b(010); $\Sigma \wedge c = 108^\circ$ (?) in obtuse $\angle \beta$	(G)
	C ₁₀ H ₈ OCl ₄	Hexachloro- β -ketohydronaphthalene	R	Bi	+	91° 6' (at axis c)		Ax. pl. a(100); Σ || b	(G)
	C ₁₀ H ₈ OCl ₄	Trichloro- α -ketonaphthalene	M	Bi	—		113° 20'	Ax. pl. \perp b(010); $\Sigma \wedge c = 66^\circ$ in acute $\angle \beta$	(G)
	C ₁₀ H ₈ OCl ₄	α -Trichloro- β -ketonaphthalene	R	Bi	—	57° 6'	93° 34'	Ax. pl. a(100); Σ || c	(G)
	C ₁₀ H ₈ OCl ₄	α -Pentachloro- β -ketohydronaphthalene	M	Bi	—			Ax. pl. \perp b(010); $\Sigma \wedge c = 17^\circ$ 57' (?) in acute $\angle \beta$	(G)
3404	C ₁₀ H ₈ O ₄ N ₂	1, 3, 5-Trinitronaphthalene	R	Bi	—		91° 14'	Ax. pl. c(001); $X || a$	(G)
3495	C ₁₀ H ₈ Cl ₄	Naphthalene tetrachloride	M	Bi			84° (apprx)	Ax. pl. \perp b(010)	(G)
	C ₁₀ H ₈ O ₂ N ₂	Duonitrososaxafrol anhydride	R	Bi	—		62° 14'	Ax. pl. c(001); $X || b$	(G)
	C ₁₀ H ₈ O ₂	Pinastriac acid	R.	Bi	+			Ax. pl. a(100); Σ || c	(G)
3539	C ₁₀ H ₈ O ₂ S ₂ ·4H ₂ O	Naphthalene-1, 5-disulfonic acid	M	Bi	—	55° 34' (calc)		Ax. pl. \perp (010); $\Sigma \wedge c = 84^\circ$ 0.5' in acute $\angle \beta$	(41)
3540	C ₁₀ H ₈ O ₂ S ₂ ·4H ₂ O	Naphthalene-1, 6-disulfonic acid	M.	Bi.		79° 0.5'		Ax. pl. \perp (010); $\Sigma \wedge c = 72^\circ$ 70' in acute $\angle \beta$	(41)
	C ₁₀ H ₈ O ₂ Br	Phenylsobromo butyro lactone	M.	Bi			57° 12'	Ax. pl. \perp b(010); $\Sigma \wedge c = 8^\circ$ 45' in obtuse $\angle \beta$	(G)

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3585	$C_{10}H_8O_2N$ $C_{10}H_8O_2N$	Phthalylethylhydroxyamine Phthaloxime ethyl ether	R R.	B. B.	—		91° 17' 70° (apprx.)	Ax. pl. a(100); X c B ₂ a ⊥ (001)	(G) (24)
	$C_{10}H_8O_6N$ $C_{10}H_8O_6N_2$	Dimethylnitroterephthalate Nitrodinitroresorcinol peroxide	Tri. M.	B. B.	—	73° 48'	95° 30'	X ⊥ b(010) Ax. pl. b(010); Z ∧ c = 38° in acute $\angle\beta$	(G) (G)
	$C_{10}H_8O_2N_2$ $C_{10}H_8O_2N_2$	N-Phenyl-3-methylpyrazolone Dinitroresorcinol anhydride	M. M.	B. B.			72° 56'	Ax. pl. ⊥ b(010); Z||b Ax. pl. ⊥ b(010); Z ∧ c = 40° in acute $\angle\beta$	(G) (G)
	$C_{10}H_{12}O_4$	Phenylisobutyrolactone	M	B.				Ax. pl. b(010); Z ∧ c = 96° in obtuse $\angle\beta$	(G)
	$C_{10}H_{12}O_4$	2, 4-Dihydroxybenzoic acid	M.	B.	—		106° 20' (red)	Ax. pl. ⊥ b(010)	(G)
	$C_{10}H_{12}O_2N_2Cl$ $C_{10}H_{12}O_2N_2Cl$	Dinitrochlorocymene 2-Chloro-5, 6-dinitrocymene	? M.?	B. B.	+		120° 70°		(37) (37)
	$C_{10}H_{12}O_2N$ $C_{10}H_{12}O_2N$	β - β -Dimethyl- α -indolone β -1-thyl- α -indolone	R. M.	B. B.	—	40° 39'	81° 48' 38° (apprx.)	Ax. pl. c(001); X||a Ax. pl. ⊥ b(010)	(G) (G)
	$C_{10}H_{12}O_4N$	Nitrocinic acid	M.	B.	—	36° 58'	64° 23'	Ax. pl. b(010); X ∧ c = 14° 11' in acute $\angle\beta$	(G)
	$C_{10}H_{12}O_4N_2$	p-Aminophenacetic acid	M.	B.	—		102° 30'	Ax. pl. ⊥ b(010); X nearly ||c	(G)
	$C_{10}H_{12}O_4N_2$ $C_{10}H_{12}O_4N_2$ $C_{10}H_{12}O_4$	α -Dinitroresorcinol Ethyl N ω -phenyl allophanate p-Methoxyhydroquinone acid	M. B. M.	B. B. B.	+		30° 45' 77° 58'	Ax. pl. ⊥ b(010) Ax. pl. b(010); Z ∧ c = 57° in acute $\angle\beta$	(G) (*) (G)
	$C_{10}H_{12}O_4$ $C_{10}H_{12}O_4S$ $C_{10}H_{12}O_4$	Cantharidin α -Phenylsulfonylbutyric acid Methyl 4-hydroxy-3, 5-dimethoxybenzoate	R. R. M	B. B. B.	—	89° 7' 46° 45'	63° (apprx.)	Ax. pl. c(001); Z||b Ax. pl. b(010); X||a Ax. pl. b(010); X ⊥ r(101)	(G) (G) (G)
	$C_{10}H_{12}Br_2$	Tribromocamphene	R	B.	—	80° (apprx.)		Ax. pl. c(001); X||b	(G)
3709	$C_{10}H_{12}ON$	N-Ethylacetamide	R	B.	+		103° 27'	Ax. pl. b(010); Z||c	(G)
3716	$C_{10}H_{12}ON$ $C_{10}H_{12}ON$	Phenacetin p-Tolyl urethane	M. M.	B. B.	—	62° 14'	59° 46'	Ax. pl. b(010) Ax. pl. b(010); X ∧ c = 27° in acute $\angle\beta$	(G) (G)
	$C_{10}H_{12}ON$	Vanillyl acetamide	M	B.	+		110° (115° calc.)		(24)
3732	$C_{10}H_{14}$	1, 2, 4, 5-Tetramethylbenzene	M	B.	—	87° 22'		Ax. pl. b(010); X ∧ c = 0° 54' in obtuse $\angle\beta$	(G)
	$C_{10}H_{14}OBr$	d-Bromopseudonitrosocamphor	R.	B.	+	79° (apprx.)		Ax. pl. c(001); Z||a	(G)
3742	$C_{10}H_{14}OBr_2$ $C_{10}H_{14}OBr_2$ $C_{10}H_{14}OCl_3$ $C_{10}H_{14}OSCl_3$	d- α , α' -Dibromocamphor d- α , β -Dibromocamphor d- α , π -Trichlorocamphor d- α -Chloro- π -camphorsulfonamide chloride	R. R. R. R.	B. B. B. B.	— — — +	56° 5' 77° 51'	90° 38' 62° 18'	Ax. pl. a(100); X||b Ax. pl. b(010); X||c Z||c Ax. pl. a(100); Z||b	(G) (G) (G) (G)
3756	$C_{10}H_{14}ON_2S_2$ $C_{10}H_{14}O$ $C_{10}H_{14}O_4$	Ammonium naphthalene-1, 5-disulfonate Thymol dl-Camphoric anhydride	M Tri. R.	B. B. B.	— — —	49° 40'	31° 20' (red)	Ax. pl. ⊥ (010) Ax. pl. a(100); X||c	(41) (G) (G)
	$C_{10}H_{14}O_4$ $C_{10}H_{14}O_4$	Tetramethylpionol Methyl α -anhydrocamphoramate	R. R.	B. B.	— —	49° 13'	80° 1' 120° (apprx.)	Ax. pl. a(100); Z||c Ax. pl. a(100); X||b Ax. pl. a(100); X||b	(G) (G) (G)
	$C_{10}H_{14}O_4$	Methyl β -anhydrocamphoramate	R.	B.	—		33° (apprx.)		(G)
3779	$C_{10}H_{14}O_4$ $C_{10}H_{14}OBr$	Dimethyl dimethylacetate d- β -Bromocamphor	R. R.	B. B.	— +	62° 36' 76° (apprx.)	103° 29'	Ax. pl. c(001); Z||b Ax. pl. a(100); Z||c	(G) (G)
	$C_{10}H_{14}ON_2Br$ $C_{10}H_{14}ON_2Br$ $C_{10}H_{14}OBr_2$ $C_{10}H_{14}OSBr$ $C_{10}H_{14}OSCl$	α -Bromopseudonitrosocamphor β -Isobromopseudonitrosocamphor dl(1)-Dihydrocarvone tribromide d- π -Camphorsulfonyl bromide d- π -Camphorsulfonyl chloride	R. R. R. R. R.	B. B. B. B. B.	— — — — +	99° 28' 69° 20' 59° 45' 35° 45° (apprx.)	90° 28' 69° 20' 59° 45' 35° 45° (apprx.)	Ax. pl. b(010); Z||c Ax. pl. a(100); Z||c Ax. pl. (100); Z||c Z||c Z||c Ax. pl. c(001)	(G) (G) (G) (G) (G) (G)
	$C_{10}H_{14}ON$	l-Ratanol sulfate	R.	B.			75° (apprx.)		(G)
	$C_{10}H_{14}NBr$	Diethylamine hydrobromide	M.	B.	—	77° 33'		Ax. pl. ⊥ b(010); X ∧ c = 70° in obtuse $\angle\beta$	(G)
3867.1	$C_{10}H_{14}OBr_2$ $C_{10}H_{14}NI$ $C_{10}H_{14}O_4$	Pinol dibromide p-Tolyltrimethylammonium iodide dl-Pinonic acid	R. R. M.	B. B. B.	— — +	131° 21' 20° 36'	20° 36'	Ax. pl. a(100); X||c Ax. pl. b(010); Z||c Ax. pl. b(010); Z ∧ c = 57° in acute $\angle\beta$	(G) (G) (G)
	$C_{10}H_{14}O_4$ $C_{10}H_{14}O_4$	d- α -Thugene ketone acid Isoketocamphoric acid	R. M.	B. B.	— +	74° 14' 80° (apprx.)		Ax. pl. a(100); Z||c Ax. pl. b(010); Z nearly ⊥ c(001)	(G) (G)
3873	$C_{10}H_{14}O_4, H_2O$	l-Cineolic acid	R.	B.	—	25° 30'		Ax. pl. b(010); X c	(G)
3886.1	$C_{10}H_{14}ON$	dl- α -Pinoxonine	M.	B.	+		60°-70°	Ax. pl. b(010); Z ∧ c = 10° in acute $\angle\beta$	(G)

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3064	$C_{10}H_{16}O_2$	2-Hydroxy- Δ^1 , 3- <i>p</i> -menthenone.	M	Bi.	—			$X \wedge c = 63^\circ 6'$ in obtuse $\angle \beta$	(G)
	$C_{10}H_{16}O_4$	α , α' -Methylisopropyl- α , α' -dihydroxy-adipic acid	?	Bi.	—		73°		(87)
	$C_{10}H_{15}ON$	Δ^1 , 8-Methylnonenyl amide	?	Bi.	+		80°		(88)
	$C_{10}H_{15}ONCl$	Lupinine hydrochloride	R.	Bi.	+	50° 18'	102° 10'	Ax. pl. c(001); $Z \parallel a$	(G)
	$C_{10}H_{15}O_5N_2 \cdot 3H_2O$	α -2, 5-Dimethylpiperazine tartrate	M	Bi.	—		80° (apprx.)	Ax. pl. $\perp b(010)$	(G)
	$C_{10}H_{16}NPS$	Triethylallylphosphothiourea	M.	Bi.	—	72° 30'		Ax. pl. b(010); $X \wedge c = 24^\circ$ in acute $\angle \beta$	(G)
3080	$C_{10}H_{16}O_2$	cis-Terpene hydrate	R	Bi.	+	77° 27'		Ax. pl. b(010); $Z \parallel a$	(G)
	$C_{10}H_{16}O_2$	trans-Terpene	M	Bi.	+		74° 13'	Ax. pl. $\perp b(001)$; $Z \wedge c = 5^\circ 6'$ in acute $\angle \beta$	(G)
4043	$C_{11}H_{16}O_{10} \cdot 5H_2O$	Benzeneperdicarboxylic acid	R	Bi.	—		57° 30'	Ax. pl. b(010); $X \parallel c$	(G)
	$C_{11}H_7N_3O_4$	6-Phenylure acid	Un.						(8.8)
	$C_{11}H_7O_2Br$	Phenylbromopyracemic acid	R	Bi.	—	50° 50'		Ax. pl. b(010); $Z \parallel a$	(G)
	$C_{11}H_7O_2N$	Citronellal	M	Bi.	+		14° 50'	Ax. pl. b(010)	(G)
	$C_{11}H_{11}O_2Cl_3$	Trichloromethyl- α -methoxyphenyl-carbinol acetic ether	M	Bi.	—		75° 11'	Ax. pl. $\perp b(010)$	(G)
	$C_{11}H_{11}O_2N$	Glutaric anilide	M	Bi.	—		90°	Ax. pl. (010)	(88)
4053	$C_{11}H_{11}ON_2Br$	4-Bromomantipyrene	Ditrag.	Un.					(G)
	$C_{11}H_{11}O_2N$	β -Benzyl malamide	R	Bi.	—	62° 06°		Ax. pl. b(010); $X \parallel c$	(G)
4058	$C_{11}H_{11}O_2N$	Ethyl α -nitrocinamate	R	Bi.	—		57° 40'	Ax. pl. c(001); $X \parallel a$	(G)
	$C_{11}H_{11}O_2N_2$	4-Indomantipyrene	Trag.	Un.					(G)
4086	$C_{11}H_{13}O_2Br_2$	Ethylbromocinnamate	M	Bi.	—	86° (apprx.)		Ax. pl. b(010); $X \wedge c = 7^\circ$ in acute $\angle \beta$	(G)
	$C_{11}H_{13}ON_2$	Antipyrene	?	Bi.	—	54° 20'	103° 21'		(L-B)
	$C_{11}H_{13}O_2N_2$	4-Hydroxyantipyrene	M.	Bi.	—		116° 23'	Ax. pl. b(010); $Z \perp c(001)$	(G)
	$C_{11}H_{13}O_2N$	Methyl phenacetate	R	Bi.	—			Ax. pl. b(010)	(G)
	$C_{11}H_{13}ON_2$	Cytosine	R	Bi.	+	61° 30 5'		Ax. pl. a(100); $Z \parallel c$	(G)
	$C_{11}H_{13}O_2N_2$	Ethyl α -phenylhydrazine pyrazinamate	M	Bi.	—			Ax. pl. $\perp b(010)$; $X \wedge c = 47^\circ 1'$ in acute $\angle \beta$	(G)
4184	$C_{11}H_{13}O_4$	Methyl 3, 4, 5-methoxybenzoate	M	Bi.	—		113° 13' (white)	Ax. pl. $\perp b(010)$	(G)
	$C_{11}H_{13}ON_2Br \cdot H_2O$	Cytosine hydrobromide	M	Bi.	—	87° (apprx.)		Ax. pl. b(010)	(G)
	$C_{11}H_{13}ONCl$	Methyl 3, 4, 5-trimethoxy-2-aminobenzoate	R	Bi.	—		70° (apprx.)	Ax. pl. c(001); $X \parallel a$	(G)
	$C_{11}H_{13}ON_2Cl \cdot H_2O$	Cytosine hydrochloride	M.	Bi.	—	72° (apprx.)		Ax. pl. b(010); $Z \wedge c = 55^\circ$ in obtuse $\angle \beta$	(G)
	$C_{11}H_{13}O_2N$	Vanillyl propanamide	R	Bi.	—		100° (08° calc.)		(84)
	$C_{11}H_{13}O_2N$	Pyrocatechol carboxyl diethylamide	M.	Bi.	+		7° 56'	Ax. pl. b(010); $Z \wedge c = 55^\circ$ in obtuse $\angle \beta$	(G)
	$C_{11}H_{13}O_2N$	α -Benzylhydroxylamine ditartrate	R	Bi.	—		90° (apprx.)	Ax. pl. a(100); $Z \parallel b$	(G)
	$C_{11}H_{13}O_2N_2$	Nitrosoaniline nitroaniline	R.	Bi.	+	82° 51'		Ax. pl. b(010); $Z \parallel c$	(G)
	$C_{11}H_{13}O_2N_2 \cdot H_2O$	Cytosine nitrate	M.	Bi.	+	38° 40'		Ax. pl. b(010)	(G)
	$C_{11}H_{13}ON_2$	Aniline intraniline	R	Bi.	+	88° 21'		Ax. pl. a(100); $Z \parallel c$	(G)
	$C_{11}H_{13}O_4$	Dimethyl camphoromate	R.	Bi.	—		50° (apprx.)	Ax. pl. b(010); $X \parallel a$	(G)
	$C_{11}H_{13}ON_2Cl$	Amylene nitraniline hydrochloride	M.	Bi.	+	75° 41'		Ax. pl. $\perp b(010)$	(G)
	$C_{11}H_{13}NBr$	Diethyl- <i>p</i> -toluidine hydrobromide	M.	Bi.	+	69° 41.5'		Ax. pl. $\perp b(010)$	(G)
	$C_{11}H_{13}O_4$	Ethyl camphoromate	M	Bi.	—		50° (apprx.)	Ax. pl. $\perp b(010)$	(G)
	$C_{11}H_{13}O_4$	Triethyl desoxalate	M	Bi.	—		61° 50'	Ax. pl. $\perp b(010)$	(G)
	$C_{11}H_{13}ON_2$	Terpene nitrodimethylamine	M	Bi.	—	55° 20'	93° 56'	Ax. pl. $\perp b(010)$; $Z \wedge c = 31^\circ$ in obtuse $\angle \beta$	(G)
	$C_{11}H_{13}O_2N$	<i>N</i> -Methyl-2, 2, 6, 6-tetramethyl-4-hydroxypiperidine carboxylic acid	R	Bi.	—	82° 31'		Ax. pl. a(100); $X \parallel b$	(G)
	$C_{11}H_8$	Acenaphthylene	R	Bi.	+	70° 16'	114° 46'	Ax. pl. a(100); $Z \parallel b$	(G)
	$C_{11}H_8Br_2$	<i>p</i> , <i>p'</i> -Dibromodiphenyl	M.	Bi.	—	50° 00° (apprx.)		Ax. pl. $\perp b(010)$	(G)
	$C_{11}H_{10}$	Acenaphthene	R	Bi.	+	70° 20'	115° 40'	Ax. pl. a(100); $Z \parallel b$	(G)
	$C_{11}H_{10}Cl$	Diphenylodanum chloride	M.	Bi.	—		large	Ax. pl. b(010)	(G)
	$C_{11}H_{10}N_2$	Azobenzene	M.	Bi.	+		50° 5'	Ax. pl. $\perp b(010)$; $Z \wedge c = 62^\circ$ in acute $\angle \beta$	(G)
	$C_{11}H_{10}ON_2$	α -Benzoylpyridine oxime	R.	Bi.	—	66°		Ax. pl. b(010); $Z \parallel a$	(G)
	$C_{11}H_{10}ON_2$	γ -Benzoylpyridine oxime	M	Bi.	—	28°		Ax. pl. b(010); $Z \wedge c = 62^\circ$ in obtuse $\angle \beta$	(G)
4261	$C_{11}H_{10}O_4S_4$	Benzene sulfone tetralsulfide	Tet.	Un.					(G)
	$C_{11}H_{10}S_2$	Diphenyl disulfide	R.	Bi.	—		85° (apprx.)	Ax. pl. b(010); $X \parallel c$	(G)
	$C_{11}H_{10}O_2SBr$	Ethyl 1, 5-bromonaphthalene sulfonate	R.	Bi.	—		20° 52'	Ax. pl. a(100); $Z \parallel b$	(G)
	$C_{11}H_{10}O_2SCl$	Ethyl 1, 5-chloronaphthalene sulfonate	M.	Bi.	—	42° (apprx.)		Ax. pl. b(010)	(G)
	$C_{11}H_{11}ON$	α -Phenylpyridyl carbinol	R.	Bi.	—	65°		Ax. pl. c(001); $Z \parallel a$	(G)

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4272	C ₁₁ H ₁₇ O ₄ NH	Benzeneulfamide	Tet	Un					
	C ₁₁ H ₁₅ O ₄ N	Vanillyl n-butyramide	Tri	Bi.	+		Very large		(14)
	C ₁₁ H ₁₅ O ₄ N	Vanillyl isobutyramide	R.	Bi.	-		18°		(14)
							(17° 48' calc.)		
	C ₁₁ H ₁₅ O ₄	Ethyl β-methylcoumarilate	R	Bi			72° 34'	Ax. pl. b(010); Z||c	(G)
	C ₁₁ H ₁₅ O ₄	cis-Dimethylsuccinic acid	R	Bi			124° 4'	Ax. pl. (010); Bx ⊥ (001)	(14)
							(Hg, yellow)		
	C ₁₁ H ₁₅ O ₄	Acetotetrahydrocannabinol acid	R	Bi	-		12° 24'	X||b	(G)
	C ₁₁ H ₁₅ Nl	Tetraethyl ammonium iodide	R	Bi	-		30° 1'	Ax. pl. (100); X||b	(G)
	C ₁₁ H ₁₅ Nl	1, 3, 3-Triethyl-2-methylene indoline hydrobromide	R	Bi	-	23° 48'	57° 16'	Ax. pl. c(110); X||b	(G)
4318.1	C ₁₁ H ₁₅ ON ₂	1-P-hen-y-1,3-methyl-1-dimethylpyrazolone	M	Bi		74° 2'		Ax. pl. ⊥ b(010)	(G)
	C ₁₁ H ₁₅ ON ₂	1-Methylantipyrine	M	Bi		86° (apprx)		Ax. pl. b(010); Z Δ c = 47° in acute ΔB	(G)
	C ₁₁ H ₁₅ O ₄	Ethyl p-methoxycinnamate	M	Bi				Ax. pl. b(010)	(G)
	C ₁₁ H ₁₅ O ₄	Dimethyl phenylsuccinate	M	Bi	+		10° (apprx)	Ax. pl. ⊥ b(010)	(G)
	C ₁₁ H ₁₅ ONal	1-Phenyl-3-methyl-5-methoxypyrazole-2-methiodide	M	Bi.	-	72°		Ax. pl. b(010); X Δ c = 73° in obtuse ΔB	(G)
	C ₁₁ H ₁₅ ONal	Antipyrine pseudomethiodide				75° 41'			(L-B)
	C ₁₁ H ₁₅ ONal	Antipyrine pseudoethiodide	M	Bi	+	74° 45'		Ax. pl. b(010); Z Δ c = 84° 30' in obtuse ΔB	(G)
	C ₁₁ H ₁₅ ON	7-Isopropylhydrocannabinol	R	Bi		61° 51'		Ax. pl. b(010); Z||a	(G)
	C ₁₁ H ₁₅ O ₄ N	Ethyl phenacetate	R	Bi				Ax. pl. b(010); Z||a	(G)
	C ₁₁ H ₁₅ O ₄ N	Vanillyl crotonylamide	R	Bi.	+		Large		(14)
4330.1	C ₁₁ H ₁₅ O ₄	2, 5-Dioxyacetophenone diethyl ether	Tri	Bi		85° (apprx)		Ax. pl. ⊥ c(001)	(G)
	C ₁₁ H ₁₅ O ₄ N ₂	Nitrosoamylenol p-toluidine	R	Bi	+	77° 50'	107° 37'	Ax. pl. ⊥ b(010); Z||c	(G)
	C ₁₁ H ₁₅ ONaCl	Amilenol p-toluidine hydrochloride	M	Bi	+	59° 20'	97° 30'	Ax. pl. ⊥ b(010); Z Δ c = 12° in obtuse ΔB	(G)
	C ₁₁ H ₁₅ ON ₂	Amilenol p-toluidine	M	Bi	-		72° 40'	Ax. pl. b(010); X Δ c = 35° in acute ΔB	(G)
	C ₁₁ H ₁₅ O ₄	Dimethylantranthidin	R	Bi	+		116°	Ax. pl. b(010)	(G)
	C ₁₁ H ₁₅ O ₄	Diethyl 1, 1-diacetoacemate	M	Bi	+	64° (apprx)		Ax. pl. b(010)	(G)
	C ₁₁ H ₁₅ O	Matric camphor	Trig	Un.					(G)
	C ₁₁ H ₁₅ O ₄	Methyl l-boroyl xanthate	R	Bi	-	33° 24'		Ax. pl. b(010); X||a	(G)
	C ₁₁ H ₁₅ ON ₂	Terpene nitrodiethylamine	M	Bi.		70° 53'	128° 32'	Ax. pl. ⊥ b(010); Z Δ c = 26° in obtuse ΔB	(G)
	4394	C ₁₁ H ₁₅ O ₁₁ .H ₂ O	Lactose	M	Bi.	-		33° 35'	Ax. pl. ⊥ b(010); X Δ c = 10° 11° in obtuse ΔB	(G)
C ₁₁ H ₁₅ O ₁₁		Saccharose	M	Bi	-	48° 0'	79° 7'	Ax. pl. b(010); X Δ c = 07° 45' in obtuse ΔB	(G)
4397	C ₁₁ H ₁₅ O ₁₁ .2H ₂ O	Trehalose	R	Bi	+	50° 10'	78° 50'	Ax. pl. b(010); Z||c	(G)
	C ₁₁ H ₁₅ O ₁₁ .2H ₂ O	α-Comone ditartrate	R	Bi	+		43° 33'	Ax. pl. a(100); Z||c	(G)
	C ₁₁ H ₁₅ O ₁₁ .3H ₂ O	Ammonium mellitate	R	Bi	-		17°	Ax. pl. b(010) (red), X||c	(G)
4434	C ₁₁ H ₁₅ O ₄ Cl ₃	Phenyl 3, 5-dichlorosulfate	R	Bi	-		(apprx)		
	C ₁₁ H ₁₅ N	Acridine	R				70° 35'	Ax. pl. a(100); X||c	(G)
							117°	Ax. pl. c(001); Z||a	(G)
4454	C ₁₁ H ₁₅ N ₂	Benzoyl-α-phenylenediamine	M	Bi	+		(apprx)		
							63°	Ax. pl. b(010); Z nearly ⊥ c(001)	(G)
	C ₁₁ H ₁₅ O ₄	p-Hydroxybenzophenone	R	Bi	-		96° 20'	Ax. pl. b(010); X||a	(G)
4500	C ₁₁ H ₁₅ O ₄ Br	Phenyl m-bromobenzoate	R	Bi	+		41° 4'	Ax. pl. b(010); Z||c	(G)
	C ₁₁ H ₁₅ O ₄ N ₂	p-Aminobenzenesulfonic acid	M	Bi				Ax. pl. (010); Z = c	(8)
	C ₁₁ H ₁₅ O ₄ Br ₂	Ethyl dibromohydroxydimethylsuccinamate	M	Bi			80°	Ax. pl. b(010); Z Δ c = 30° in obtuse ΔB	(G)
							(apprx)		
	C ₁₁ H ₁₅ O ₄ Cl ₃	Ethyl dichlorohydroxydimethylsuccinamate	M	Bi			75°	Ax. pl. ⊥ b(010); Z Δ c = 30°-35° in obtuse ΔB	(G)
							(apprx)		
	C ₁₁ H ₁₅ ON ₂	p-Hydroxy-p'-methylazobenzene	M	Bi	-		52° 30'	Ax. pl. b(010); X Δ c = 57° in obtuse ΔB	(G)
4509	C ₁₁ H ₁₅ O ₄ N ₂	1, 3-Dimethyl-9-phenylurea acid		Bi			Large		(11)
	C ₁₁ H ₁₅ O ₄ N ₂	1, 3-Dimethyl-9-phenylpseudouric acid		Bi			Large		(11)
	C ₁₁ H ₁₅ O ₄ N ₂	Phenyl p-toluene sulfonate	R	Bi	-		84° 19'	Ax. pl. a(100); X||b	(G)
	C ₁₁ H ₁₅ O ₄ N	Acetamidopropyltartrate anhydride	M	Bi			80° 2'	Ax. pl. ⊥ b(010); Z ⊥ c(001)	(G)
	C ₁₁ H ₁₅ O ₄	Ethyl hydroxydimethylsuccinamate	R	Bi	+		65°	Ax. pl. c(001); Z||a	(G)
4530.1	C ₁₁ H ₁₅ ON ₂	4-Ethylantipyrine	M	Bi			(apprx)		
							30°	Ax. pl. b(010); Z Δ c = 40° in obtuse ΔB	(G)
4530.2	C ₁₁ H ₁₅ ON ₂	1-Phenyl-2-propyl-3-methylpyrazolone	M	Bi		52° 50'	79° 59'	Ax. pl. ⊥ b(010); Z||b	(G)
	C ₁₁ H ₁₅ O ₁₀	Glycoallin	M	Bi.	-		55°	Ax. pl. b(010); X Δ c = 16° in obtuse ΔB	(G)
							(apprx.)		
	C ₁₁ H ₁₅ ONal	1-Phenyl-3-methyl-5-ethoxypyrazole-2-methiodide	M	Bi.	-		88° (apprx.)	Ax. pl. ⊥ b(010); X b	(G)

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	$C_{12}H_{10}NCl$	2-Methyl-3, 3-diethyl 2, 3-dihydroindol hydrochloride	M	Bi	-	81° 51'			(G)
	$C_{12}H_{10}NI$	Methylethylallyl- <i>p</i> -tolyl ammonium iodide	R	Bi			80° (apprx)	Ax pl c(001), Z c	(G)
	$C_{12}H_{16}O_4$	Pentaerythritol tetraacetate	Tet	Un					(18)
	$C_{12}H_{15}OS_2$	Ethyl <i>dl</i> -bornylxanthate	R	Bi	-		51° 16'	Ax pl b(010)	(G)
	$C_{12}H_9O_2N_2Cl_3$	Dinitrodichlorodiphenyltrichloroethane	M	Bi	-		58° (apprx)	Ax pl b(010); $X \wedge c = 28^\circ 30'$ in obtuse $\angle \beta$	(G)
	$C_{12}H_8Cl_2Br_2$	1, 1-Di(bromophenyl)-2-dichloroethylene	R	Bi	+		34° 22'	Ax, pl. c(001), Z||a	(G)
	$C_{12}H_8Cl_4$	1, 1-Dichlorophenyl-2-dichloroethylene	R	Bi	+		34° 26'	Ax pl b(010), Z||a	(G)
	$C_{12}H_8Cl_2Br_2$	1, 1-Di(bromophenyl)-2-trichloroethane	R	Bi	+		62° 12'	Ax pl c(001), Z||b	(G)
4650	$C_{12}H_{10}$	Diphenylacetylene	M	Bi			42° (red)	Ax pl \perp b(010)	(G)
	$C_{12}H_{10}Cl_2$	1, 1-Diphenyl-2-dichloroethylene	M	Bi	-		30° 54' (red)	Ax pl \perp b(010)	(G)
4636 1	$C_{12}H_{10}O_2N_2$	Phthalylphenylhydrazine (orange yellow)	M	Bi			85° (apprx)	Ax pl \perp b(010)	(G)
4672	$C_{12}H_{10}O_2$	Benzil	Trig	Un					(G)
4661	$C_{12}H_{10}O_4$	Diisobutylaldehyde	M	Bi					(G)
4688	$C_{12}H_{10}O_4$	Benzoyl peroxide	R	Bi				Ax pl a(100); Z||b	(G)
	$C_{12}H_{11}Br_3$	Diphenyltribromoethane	M	Bi	+		110°	Ax pl b(010)	(G)
4703	$C_{12}H_{11}O_2N$	Dibenzohydroxamic acid	R	Bi	+		54° 45' (red)	Ax pl a(100); Z||b	(G)
4708	$C_{12}H_{12}$	Stilbene	M	Bi	+		91° 43' (red)	Ax pl \perp b(010), $Z \wedge c = 60^\circ$ in acute $\angle \beta$	(G)
	$C_{12}H_{13}N_4$	1, 5-Diphenyl-3-mimotriazole	M	Bi				Ax pl b(010)	(G)
	$C_{12}H_{10}O$	Phenyl <i>p</i> -tolyl ketone	M	Bi	-		35° 15'	Ax pl \perp b(010), $X \wedge c = 36^\circ 57'$ in acute $\angle \beta$	(G)
	$C_{12}H_{11}N$	<i>o</i> -Immodibenzyl	M	Bi			60° 58 5'	Ax pl \perp b(010)	(G)
4748	$C_{12}H_{11}ON$	<i>N</i> -Benzoyl- <i>o</i> -toluidine	R	Bi	+	87° 33'		Ax pl a(100)	(G)
4749	$C_{12}H_{11}ON$	<i>N</i> -Benzoyl- <i>m</i> -toluidine	M	Bi			38° 10'	Ax pl \perp b(010)	(G)
4750	$C_{12}H_{11}ON$	<i>N</i> -Benzoyl- <i>p</i> -toluidine	R	Bi		73° 43'		Ax pl c(001), Z||b	(G)
4752	$C_{12}H_{11}ON$	<i>N</i> -Diphenylacetamide	R	Bi	+	52° 2'		Ax pl c(001), Z||a	(G)
	$C_{12}H_{11}O_2N_3$	<i>o</i> -Nitrobenzyl- <i>o</i> -toluidine	R	Bi			40° (red)	Ax pl a(100), Z||b	(G)
	$C_{12}H_{13}O_2N_3$	ω , ω' -Diphenylurea		Bi					(8.8)
	$C_{12}H_{13}ON_3$	Phenyl- <i>o</i> -phenetol	M	Bi	-	68°	154° (apprx)	Ax pl \perp b(010); $X \wedge c = 39^\circ$ in acute $\angle \beta$	(G)
4783	$C_{12}H_{10}O_2$	Isobenzofuran	M	Bi	-	84° 59'		Ax pl \perp b(010)	(G)
	$C_{12}H_{11}O_2$	1, 2-Dihydroxyphenylethane	R	Bi	+		122° 14'	Ax pl (100)	(*)
	$C_{12}H_{11}O_4$	<i>o</i> , <i>o'</i> -Dimethoxydiphenyl	R	Bi			5°	Ax pl (010); $R_{20} \perp c(001)$	(10)
	$C_{12}H_{11}O_4S_4$	Tolyl <i>p</i> -toluol thiosulfonate	M	Bi			19° 29'	Ax pl \perp b(010); Z||b	(G)
	$C_{12}H_{11}O_4S_4$	<i>p</i> -Toluenesulfone trisulfide	Tet	Un					(G)
4787	$C_{12}H_{11}S$	Dibenzyl sulfide	R	Bi	-	67° 38'		Ax pl b(010); X||c	(G)
	$C_{12}H_{11}NO_4Br H_2O$	Dipyridinebetaine hydrobromide	R	Bi	+	87° 30'		Ax pl c(001); Z||b	(G)
	$C_{12}H_{11}ONCl H_2O$	Dipyridinebetaine hydrochloride	R	Bi	+	83° 52'		Ax pl c(001); Z||b	(G)
	$C_{12}H_{11}ONCl$	Diphenylhydroxyethylamine hydrochloride	Tr	Un	-				(G)
	$C_{12}H_{11}O_6$	β -Methyltetramethoxysuccinic acid	M	Bi	+		102° 4'	Ax pl \perp b(010); Z||c(001)	(G)
	$C_{12}H_{11}O_4N$	Thallin tartrate	R	Bi	+	78° 11'		Ax pl a(100)	(G)
	$C_{12}H_{11}O_4N_1$	Ethyl tetrahydroquinoline- <i>N</i> -acetate methiodide	M	Bi			65° 70'	Ax, pl. \perp b(010)	(G)
	$C_{12}H_{11}O_4$	Phenyleumum	M	Bi				Ax, pl. b(010); $Z \wedge c = 30^\circ 15'$ in acute $\angle \beta$	(G)
	$C_{12}H_{11}N_4$	3, 5-Diphenylpyrazole	M	Bi			41° 30'	Ax pl \perp b(010); $Z \wedge c = 44^\circ$ in acute $\angle \beta$	(G)
	$C_{12}H_{11}O_3N$	<i>syn</i> -Benzoylbenzohydroxamic methyl ether	R	Bi	-	70° 10'		Ax pl. a(100); X||c	(G)
	$C_{12}H_{11}O_3$	<i>o</i> -Hydroxydibenzoylmethane	M	Bi	+		75°	Ax, pl. (010); $R_{20} \parallel c\text{-axis}$	(12)
4919	$C_{12}H_{11}O_3$	Methyl benzilate	M	Bi	-		74° 52'	Ax, pl. \perp b(010)	(G)
	$C_{12}H_{11}O_3N$	Vanillyl benzoyl amide	R	Bi	-		85° (80° rule)		(14)
	$C_{12}H_{11}O_4NS H_2O$	<i>p</i> -Dimethylaminobenzophenone sulfonic acid	Tr	Bi			70° (apprx)	Ax pl. \parallel m(110)	(G)
	$C_{12}H_{11}O_6$	2, 6, 2', 5'-Tetrahydroxydiphenylmethyl ether	R	Bi		79° 11'		Ax pl. a(100); Z||b	(G)
4936 1	$C_{12}H_{11}O_6 H_2O(?)$	Picrotonin	R	Bi				Ax pl c(001)	(G)
	$C_{12}H_{11}O_7$	Hypocotinin	R	Bi			46° (apprx)	Ax pl b(010); Z||b(?)	(G)
4943	$C_{12}H_{11}O_4$	Santonin	R	Bi	+		41° 17' 43° 33'	Ax, pl. a(100); Z||b	(17)
	$C_{12}H_{11}O_4$	Santonide	R	Bi	+	67° 1' (red)		Ax, pl. a(100); Z||c	(G)
	$C_{12}H_{11}O_4$	Parasantonide	R	Bi	-		50° 25' (red)	Ax pl a(100); X||c	(G)
	$C_{12}H_{11}O_6$	Triethyl trimesate	H	Un	-				(G)
	$C_{12}H_{11}O_6N_2Cl_2$	Butyl chloral antipyrine	Tr	Bi	-		110°		(G)
	$C_{12}H_{12}O_4$	Hydroxantonide	R	Bi	+	55° 10' (red)	93° 43' (red)	Ax, pl. a(100); Z c	(G)

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4960	$C_{10}H_{16}O_4$	Santonine acid	R	Bi.	+	87° 40'		Ax. pl. a(100)	(G)
	$C_{10}H_{16}O_4$	Metasantonine acid	R.	Bi.	+		68° 25' (red)	Ax. pl. a(100); Z c	(G)
	$C_{10}H_{16}O_4$	Parasantonine acid	R.	Bi.	-	88° 13' (red)		Ax. pl. a(100); X||c	(G)
	$C_{10}H_{16}O_4N$	α -Isopropylglutaramic acid	R	Bi.	+		117° 15'	Ax. pl. b(010); Z||c	(G)
	$C_{10}H_{16}O_4N_2$	Physostigmine	R	Bi.	-	77° 42'		Ax. pl. b(010); X||c	(G)
	$C_{10}H_{16}O_4$	Hydrosantonine acid	R	Bi.	+		100° (red)	Ax. pl. a(100); Z||c	(G)
	$C_{10}H_{16}O_4$	Photasantonine acid	R.	Bi.	-		107° 25' (red)	Ax. pl. a(100); X||c	(G)
	$C_{10}H_{16}O_4N$	Vanillyl α -heptoylamide	M.	Bi.	-		110° (107° calc.)		(24)
	$C_{10}H_{16}O(?)$	Juniperol	Tri (?)	Bi.	-	34° 46'		Ax. pl. nearly ||b(010); X Δ c = 72° in acute $\angle\beta$	(G)
	$C_{10}H_{16}O_4N$	Sesquiterpene nitrate	R.	Bi.			18° 32'	Ax. pl. a(100) (red)	(G)
4997	$C_{10}H_{16}O_4$	l-Cadinene dihydrochloride	R.	Bi.	+		30° (apprx)	Ax. pl. b(010); Z||c	(27)
	$C_{10}H_{16}O$	Cypripate camphor	R.	Bi.	+		61° 30'	Ax. pl. b(010); Z||a	(G)
	$C_{10}H_{16}O$	Cedrol	R.	Bi.	+		64° 45'	Ax. pl. b(010); Z||a	(G)
	$C_{10}H_{16}O_4$	Triacetone mannite	M	Bi.	+	77° 4'	138° 13'	Ax. pl. \perp b(010); Z Δ c = 28° 54' in obtuse $\angle\beta$	(G)
	$C_{10}H_{16}O_4$		R.	Bi.	+		Small 55° (apprx)	Ax. pl. a(100); Z||c	(G)
5028.1	$C_{10}H_{16}O_4$	Diphenylhydrazine anhydride	R.	Bi.	+			Ax. pl. \perp b(010)	(G)
	$C_{10}H_{16}O_4Br$	2, 4-Diphenyl-4-bromo- Δ^5 -cratono lactone	M	Bi.			166° (La) (apprx)	Ax. pl. b(010); Z||a	(G)
	$C_{10}H_{16}O_4$	Diphenylsuccine anhydride	R.	Bi.					(G)
5066.1	$C_{10}H_{16}N_4$	Di- p -decyanobenzylamine	Tri.	Bi.		69° 39'		Ax. pl. ||c(001)	(G)
	$C_{10}H_{16}O_4N$	α -B e u a o β -acetylbenzoylhydroxylamine	M.	Bi.	+	75° 20'		Ax. pl. \perp b(010)	(G)
	$C_{10}H_{16}N_4$	1, 5-Diphenyl-3-methyl pyrazole	M	Bi.		68° 22'		Ax. pl. b(010); Z Δ c = 7° in obtuse $\angle\beta$	(G)
5067.1	$C_{10}H_{16}O$	Benzylidene- p -tolyl ketone	R.	Bi.	+	36° 4'	61° 7'	Ax. pl. c(001); Z||b	(G)
	$C_{10}H_{16}Cl_4$	Di- p -tolyltrichloroethane	M.	Bi.	+		85° 5'	Ax. pl. b(010); Z Δ c = 4° in acute $\angle\beta$	(G)
	$C_{10}H_{16}O_4N$	Ethyl benzohydroxamic benzoate	R	Bi.	+		94° 55'	Ax. pl. a(100); Z||c	(G)
5082.4	$C_{10}H_{16}O_4N$	anti-Benzoyl benzohydroxamic ethyl ether	Tri.	Bi.	-		18° 30' (apprx.)		(G)
	$C_{10}H_{16}O_4N$	Anisoyl p -toluohydroxamic acid	M	Bi.	+	63° 49'	113° 8'	Ax. pl. b(010); Z \perp c(001)	(G)
	$C_{10}H_{16}O_4N$	p -Toluylnitrosohydroxamic acid	M	Bi.	+	50° 10'	82° 52'	Ax. pl. b(010); Z Δ c = 49° in acute $\angle\beta$	(G)
	$C_{10}H_{16}ON_4$	Phenyl styryl ketone	R, (?)	Bi.					(13)
	$C_{10}H_{16}N_4$	Acetophenone methylphenylhydrazine	M.	Bi.			Large	Ax. pl. b(010); Z \perp a(100)	(G)
	$C_{10}H_{16}ON_4$	Diacetylhydrazobenzene	R	Bi.	-	88° 45'		Ax. pl. b(010); X||a	(G)
	$C_{10}H_{16}ON_4$	2-Phenyl-1-allylbenzimidazolium sulfate	M	Bi.	+		56° 48'	Ax. pl. \perp b(010); Z Δ c = 33° 51' in obtuse $\angle\beta$	(G)
	$C_{10}H_{16}ON_4$	2, 3-Dinitro- p -xylene + 2, 6-dinitro- p -xylene	R.	Bi.	-		38° 36.5'	Ax. pl. a(100); X||c	(G)
	$C_{10}H_{16}ON.4H_2O$	l-Benzoylserine tetrahydrate.	R.	Bi.			45° (apprx)	Ax. pl. a(100); Z||b	(G)
	$C_{10}H_{16}ONBr$	Homatropine hydrobromide	R.	Bi.	-		69°-70°	Ax. pl. c(001); X||b	(G)
5131	$C_{10}H_{16}ON_2$	Antipyrine isovalerianate	M.	Bi.			68° (apprx)	Ax. pl. c(001); Z Δ c = 17° in obtuse $\angle\beta$	(G)
	$C_{10}H_{16}O_4$	Methyl santonate	R.	Bi.	-	74° 24' (red)	134° 12'	Ax. pl. a(100); X||c	(G)
	$C_{10}H_{16}O_4$	Methyl metasantonate	M.	Bi.		90°		Ax. pl. \perp b(010)	(G)
5135.1	$C_{10}H_{16}O_4$	Methyl parasantonate	R.	Bi.	-		58° 25' (red)	Ax. pl. a(100); X||c	(G)
	$C_{10}H_{16}O_4Br$	β -Bromoacetyl tetraethylphloroglucinol	M.	Bi.	+		50° (apprx)	Ax. pl. \perp b(010)	(G)
	$C_{10}H_{16}ON.H_2O$	l-Phenyl- α' -methylpiperidine d -tartrate	R	Bi.	-		55° 42'	Ax. pl. b(010); X||c	(G)
5142.1	$C_{10}H_{16}O$	Guaiol (Champaol)	Tri	Un.					(G)
	$C_{10}H_{16}ON$	Ethyl anisohydroxamic benzoate	M.	Bi.	+	71° 55'		Ax. pl. \perp b(010); Z||b	(G)
	$C_{10}H_{16}ON$	syn-Anisoylbenzohydroxamic ethyl ether	M.	Bi.	-		66° 13'	Ax. pl. \perp b(010); X Δ c = 55° 30' in acute $\angle\beta$	(G)
5202	$C_{10}H_{16}ON$	anti-Benzoylanisohydroxamic ethyl ether	M	Bi.	-		63° 7'	Ax. pl. \perp b(010)	(G)
	$C_{10}H_{16}ON.Br.3H_2O$	Morphine	R.	Bi.	-		125° (apprx)	Ax. pl. \perp to elongation	(29)
	$C_{10}H_{16}NBr$	α -Benzylphenylallyl methylammonium bromide	R.	Bi.		30°-40° (apprx)		Ax. pl. c(001); Z||b	(G)
5213.1	$C_{10}H_{16}NCl$	α -Benzylphenylallyl methylammonium chloride	R.	Bi.			100° (apprx.)	Ax. pl. c(001); Z||b	(G)
	$C_{10}H_{16}ON_4$	Oxymethylenecamphor phenylpyrazole	M.	Bi.	+		26° 40'	Ax. pl. \perp b(010)	(G)
	$C_{10}H_{16}ON_4$	Pseudoephedrine phenylthiourea	R	Bi.	+		76° 15'	Ax. pl. c(001); Z||b	(G)
5226	$C_{10}H_{16}ON_4$	Ephedrine phenylthiourea	R	Bi.	+	66° 25'	89° 43'	Ax. pl. c(001); Z||a	(G)
	$C_{10}H_{16}O_4$	(p -Dianisyl)dimethylmethane	R	Bi.	-	89° 54.5'			(G)
	$C_{10}H_{16}ON.Br.3H_2O$	Hyoscyne hydrobromide	R.	Bi.	-		101° 12' Large	Ax. pl. b(010); X||c	(G)
5228	$C_{10}H_{16}ONCl$	Cocaine hydrochloride	R.	Bi.	-		(> 120°)	Ax. pl. (010)	(27)

Index No.	Formula	Name	System	Class	Sign	2V	21'	Orientation	Lit.
	$C_{17}H_{15}O_4Br$	Ethyl <i>d</i> (l)-bromosantonate	R.	B ₁	+		123° 20'	Ax. pl. a(100); Z||c	(G)
	$C_{17}H_{15}O_4N$	Menthyl- α -nitrobenzoate	R.	B ₁	-	30° 32'	17° 24'	Ax. pl. b(010); X||c	(G)
	$C_{17}H_{15}O_4N_2$	2-Keto-6-methyl-4-(<i>p</i> -isopropyl phenyl)-1, 2, 3, 4-tetrahydropyrimidine-5-ethyl carboxylate.	M	B ₁	+	44° (apprx.)		Ax. pl. b(010)	(G)
	$C_{17}H_{15}ON_2$	α -Dipentene nitrobenzylamine	M	B ₁	+		108° 14'	Ax. pl. b(010); Z Δ c = 18° in acute $\angle\beta$	(G)
	$C_{17}H_{15}ON_2$	<i>d</i> (l)-Pinene nitrobenzylamine	R	B ₁	+		80° 0'	Ax. pl. c(001); Z||a	(G)
	$C_{17}H_{15}O_3$	1, 1, 2-Trimethyl-2-phenyleclopentane-3-ethyl carboxylate.	M	B ₁	-	65° 20'		Ax. pl. b(010); X Δ c = 50° in acute $\angle\beta$	(G)
5244	$C_{17}H_{15}O_3$	Menthyl benzoate.	R	B ₁			70° (apprx.)	Ax. pl. c(001); Z||b	(G)
5244 1	$C_{17}H_{15}O_4$	Ethyl santonate	R	B ₁	+	64° 4' (red)		Ax. pl. a(100); Z||c	(G)
	$C_{17}H_{15}O_4$	Ethyl parasantonate	R	B ₁			35° 35' (red)	Ax. pl. a(100); X||c	(G)
	$C_{17}H_{15}O_6$	Ethyl tetraacetylquinate	R	B ₁		79° 58'		Ax. pl. a(100); X||c	(G)
	$C_{12}H_{11}O_5N_2S_4Br \cdot 7H_2O$	Bismuth <i>m</i> -nitrobenzene sulfonate	M.	B ₁	+			Ax. pl. b(010); Z Δ c = about 93° in obtuse $\angle\beta$	(G)
	$C_{12}H_{11}O_5N_4$	γ -Benzolpyridine picrate	M	B ₁		62°		Ax. pl. \perp b(010); Z Δ c = 65° in obtuse $\angle\beta$	(G)
	$C_{12}H_{11}O_5N_4$	α -Benzolpyridine picrate	M	B ₁		10°		Ax. pl. b(010)	(G)
	$C_{12}H_{11}O_5N_4$	γ -Benzolpyridine picrate	Tri	B ₁		28°		Ax. pl. a(100); Z||c	(G)
	$C_{12}H_{11}O_4$	Diacetyl dihydroxy stilbene	M	B ₁	-	81° 30'		Ax. pl. \perp b(010); X Δ c = 13° in acute $\angle\beta$	(G)
5304	$C_{12}H_{11}O_7$	<i>d</i> (l)-Uanic acid	R	B ₁	+			Ax. pl. a(100); Z||c	(G)
	$C_{12}H_{11}O_8$	Diethylanthrone	R	B ₁			60° (apprx.)	Ax. pl. c(001); Z||a	(G)
	$C_{12}H_{11}O_6$	Hydrobenzoin diacetate	M	B ₁		85° (apprx.)		Ax. pl. h(010); Z Δ c = 12° in obtuse $\angle\beta$	(G)
	$C_{12}H_{11}O_6$	Isosubhydrobenzoin diacetate	R	B ₁	-	80° 54'		Ax. pl. b(010); X||c	(G)
	$C_{12}H_{11}O$	<i>syn</i> -Tetramethylanthracene hydride	R	B ₁	-		79° 83'	Ax. pl. b(010) (blue); X||c	(G)
	$C_{12}H_{10}$	Tetramethyl- <i>p</i> -stilbene	M	B ₁	+		24° (apprx.)	Ax. pl. b(010); Z Δ c = 90° in obtuse $\angle\beta$	(G)
	$C_{12}H_{10}O_2$	Benzoyl- <i>p</i> -tert.-amyl phenol	R	B ₁			58° 47'	Ax. pl. b(010); X||a	(G)
5317	$C_{12}H_{11}O_2N$	Codeine	R	B ₁	+		125° (apprx.)		(18)
5317	$C_{12}H_{11}O_2N \cdot H_2O$	Codeine	B ₁	-			130° (apprx.)		(18)
5319	$C_{12}H_{11}O_2N$	Isocodeine	R	B ₁	-			Ax. pl. b(010); X||c	(G)
5320	$C_{12}H_{11}O_2N$	Pseudocodeine	M	B ₁	+			Ax. pl. \perp b(010); Z Δ c = 22° in acute $\angle\beta$	(G)
	$C_{12}H_{11}O_5N_4$	Tetraethyl- <i>p</i> -diaminopyromellitate	M	B ₁		85°-90°		Ax. pl. b(010)	(G)
5330	$C_{12}H_{11}O_5N_4$	Capasaicin	B ₁						(18)
	$C_{12}H_{11}O_5N_4$	Hydrocapasaicin	B ₁						(18)
	$C_{12}H_{11}O_5N_4$	Vanillyl <i>n</i> -decorylamide	R	B ₁	+		23° (calc.)		(14)
5343. 1	$C_{12}H_{12}$	Fichtelite (Retene perhydride)	M	B ₁	-			Ax. pl. h(010); X||a-xyz	(G)
	$C_{12}H_{12}O_{12} \cdot 2H_2O$	Melenitose	R	B ₁	-		85°	X = a, Y = b, Z = c	(18)
	$C_{12}H_{11}O_4$	Methyl pulvinate	M	B ₁	-			Ax. pl. b(010); X||c	(G)
	$C_{12}H_{11}O_4NS$	<i>ms</i> -Phenylacridonum hydro-sulfate (green mod.)	Tri	B ₁	-	42°			(G)
	$C_{12}H_{11}O_4NS$	<i>ms</i> -Phenylacridonum hydro-sulfate (red mod.)	M.	B ₁	+			Ax. pl. b(010); Z Δ c = 78° 30' in obtuse $\angle\beta$	(G)
5414	$C_{12}H_{11}N_3$	α -Triphenylguanidine	R	B ₁	+		38° 3'	Ax. pl. c(001); Z||a	(G)
	$C_{12}H_{11}N_3I$	Phenyldiallylbenzimidazolium iodide	M.	B ₁	+	85° 40.5'		Ax. pl. \perp b(010); Z Δ c = 38° 52' in obtuse $\angle\beta$	(G)
5424	$C_{12}H_{11}O_4N$	Bulboescapine	R	B ₁	-			Ax. pl. a(100); X||b	(G)
	$C_{12}H_{11}N_3$	Cinchene	R	B ₁			100° 56'	Ax. pl. c(001); Z||b	(G)
	$C_{12}H_{11}ON_2$	Phenyldiallylbenzimidazolium hydroxide	M	B ₁	+		60° 21'	Ax. pl. b(010); Z Δ c(001)	(G)
5428 1	$C_{12}H_{11}ON_2$	Cinchonnone	R	B ₁		65° 20'		Ax. pl. c(001); Z||b	(G)
	$C_{12}H_{11}N_3Cl \cdot 2H_2O$	Cinchonine chloride	R	B ₁	+		13° (apprx.)	Ax. pl. a(100); Z||c	(G)
544†	$C_{12}H_{11}ON_2$	Cinchonidine	R	B ₁	+		100° \pm 10°	Z = b	(18)
	$C_{12}H_{11}ON_2 \cdot C_6H_6$	Cinchonidine	R	B ₁	+		Large		(18)
5442	$C_{12}H_{11}ON_2$	α -Cinchonine	M	B ₁	-		38° \pm 2°		(18)
5442	$C_{12}H_{11}ON_2$	α -Cinchonine	M	B ₁	-		35° 52'	Ax. pl. \perp b(010); X Δ c = 57° in obtuse $\angle\beta$	(G)
	$C_{12}H_{11}O$	<i>d</i> -Cinnamaldene camphor	R	B ₁	+		28° (apprx.)	Ax. pl. b(010); Z||a	(G)
	$C_{12}H_{11}ON_2Br \cdot H_2O$	Cinchonine hydrobromide	R.	B ₁			150°		(G)
	$C_{12}H_{11}ON_2Br \cdot 4C_2H_5O$	Cinchonine hydrobromide	R	B ₁			155°		(G)
	$C_{12}H_{11}ON_2Br \cdot 3(^o)H_2O$	Cinchonidine hydrobromide	R	B ₁	+		140°	Ax. pl. a(100); Z||c	(G)
	$C_{12}H_{11}ON_2Cl \cdot 2H_2O$	Cinchonine hydrochloride	M	B ₁	-		102°	Ax. pl. \perp b(010); X Δ c = 35° in obtuse $\angle\beta$	(G)
	$C_{12}H_{11}ON_2Cl \cdot 4C_2H_5O$	Cinchonine hydrochloride	R	B ₁	+		147°	Ax. pl. b(110); Z||c	(G)
	$C_{12}H_{11}ON_2I \cdot 1.5C_2H_5O$	Cinchonine hydroiodide	R	B ₁	+		147° 40'	Ax. pl. c(001); Z||b	(18)
	$C_{12}H_{11}O_2N \cdot H_2O$	Codethyline	R	B ₁	+		About 125°		(18)
	$C_{12}H_{11}O_2N \cdot 8.5H_2O$	Cinchonidine sulfate	M.	B ₁	+		115° 36'	Ax. pl. \perp b(010); Z Δ c = 50° in obtuse $\angle\beta$	(G)

Index No	Formula	Name	System	Class	Sign	2V	2E	Orientation	It
	$C_{10}H_{13}O_4N_2S_2 \cdot 5H_2O$	Cinchonidine selenate	M.	Bi.	+		156° 40'	Ax. pl. $\perp b(010)$; $Z \wedge c = 59^\circ$ in obtuse $\angle \beta$	(G)
5477	$C_{10}H_{15}O_2$	Abietic acid	M	Bi.	-		65°	Ax. pl. $b(010)$; $X \wedge c = 13^\circ$ in acute $\angle \beta$	(G)
	$C_{10}H_{15}O_4N$	Vanillyl undecenoylamide	R.	Bi.	-		Very large		(24)
	$C_{10}H_{15}O_5N$	Vanillyl α -undecoylamide	Tri	Bi.	+		110° (100° calc.)		(24)
	$C_{10}H_{14}$	Benzal fluorene	R	Bi.	+		13°	Ax. pl. $a(100)$; $Z \parallel c$	(G)
	$C_{20}H_{16}O_4$	2, 4-Dihydroxytriphenylacetic acid	M	Bi.	-	77° 18'		Ax. pl. $\perp b(010)$; $X \wedge c = 7^\circ$ in obtuse $\angle \beta$	(G)
	$C_{10}H_{17}O_4N_8$	α -Naphthylamine naphthalene- α -sulfonate		Bi.					(1)
	$C_{10}H_{17}O_5N_8$	β -Naphthylamine naphthalene- β -sulfonate		Bi.					(1)
	$C_{10}H_{17}O_4N_8$	α -Naphthylamine naphthalene- β -sulfonate		Bi.					(1)
	$C_{10}H_{17}O_5N_8$	β -Naphthylamine naphthalene- α -sulfonate		Bi.	+		85° 5'		(1)
	$C_{10}H_{15}O_4$	Polvinic acid ethyl alcoholate	R	Bi.		111°	61° 6'	Ax. pl. $a(100)$; $Z \parallel b$	(G)
	$C_{10}H_{15}O_4$	Atranoric acid	R	Bi.	+			Ax. pl. $c(001)$; $Z \parallel a$	(G)
	$C_{10}H_{17}ON$	Benzoyl- β , β -diethylmethylindolemine	M	Bi.	-		41° 25'	Ax. pl. $b(010)$; $X \wedge c = 30^\circ$ in acute $\angle \beta$	(G)
	$C_{10}H_{15}O_4N$	<i>d(l)</i> -Bulboepinone methyl ether	Tet	Un					(G)
5481	$C_{10}H_{14}O_4N$	Corydine	Tet	Un					(G)
	$C_{10}H_{15}O_5N_2$	Quinidine	R	Bi.	-		100° \pm 10°		(40)
	$C_{10}H_{17}O_4N_4$	Diethyl dihydroxysuccinate γ osazone	R	Bi.	+		113° 28'	Ax. pl. $a(100)$; $Z \parallel b$	(40)
	$C_{10}H_{15}O_4N_4 \cdot C_2H_4O$	Quinidine	R	Bi.	+		80° \pm 5°		(40)
5487	$C_{10}H_{15}O_4N_4 \cdot C_2H_4$	Quinidine	R	Bi.	+		85° \pm 2°		(40)
	$C_{10}H_{17}O_4N_4$	Quinine	R (?)	Bi.					(40)
	$C_{10}H_{17}O_5N_4 \cdot C_2H_4$	Quinine	R	Bi.	+		Large		(40)
	$C_{10}H_{15}O_4N_4 \cdot C_2H_4$	Quinine (1 mol mod.)	R	Bi.	-		110° \pm 10°		(40)
	$C_{10}H_{15}O_4N_4Br \cdot H_2O$	Bromomethylcinchonine	M	Bi.			80°	Ax. pl. $\perp b(010)$	(G)
	$C_{10}H_{15}O_4N_4S_2 \cdot 7H_2O$	Quinine sulfate	R	Bi.			19° 15'	Ax. pl. $a(100)$; $X \parallel c$	(G)
	$C_{10}H_{15}O_4N_4S_2 \cdot 7H_2O$	Quinine selenate	R	Bi.	-		77° 15'	Ax. pl. $a(100)$; $X \parallel c$	(G)
	$C_{10}H_{17}O_4N_4Br$	Cinchonidine hydrobromide methyl alcoholate	R	Bi.			142°		(G)
	$C_{10}H_{17}O_4N_4Br$	Cinchonine hydrobromide methyl alcoholate	R	Bi.	+		40° 40'	Ax. pl. $b(010)$; $Z \parallel c$	(G)
	$C_{10}H_{17}O_4N_4Cl$	Cinchonidine hydrochloride methyl alcoholate	R	Bi.	+		140°	Ax. pl. $a(100)$; $Z \parallel c$	(G)
	$C_{10}H_{17}O_4N_4Cl$	Cinchonine hydrochloride methyl alcoholate	R	Bi.	+		157°	Ax. pl. $b(010)$; $Z \parallel c$	(G)
	$C_{10}H_{17}O_4N_4I$	Cinchonine hydroiodide methyl alcoholate	R	Bi.	+		126° 50'	Ax. pl. $b(010)$; $Z \parallel c$	(G)
5488	$C_{10}H_{15}N_4$	Diethylamine azylene	M	Bi.					(G)
	$C_{10}H_{15}O_4$	<i>d</i> -Pinic acid	R	Bi.	+		76° 36'	Ax. pl. $a(100)$; $Z \parallel c$	(G)
	$C_{10}H_{15}O_4$	<i>l</i> -Pinic acid	R	Bi.	+	(?)	110° 22'	Ax. pl. $a(100)$; $Z \parallel b$	(G)
	$C_{10}H_{15}O_4$	Cumylphosphoric acid	R	Bi.	+	61° 45'	126° 50'	Ax. pl. $a(100)$	(G)
	$C_{10}H_{15}O_4N_4Cl_2$	<i>d(l)</i> - α -Lamaine nitrosylchloride	M	Bi.	+		99° 34'- 100° 15'	Ax. pl. $b(010)$; $Z \wedge c = 4^\circ$ 50° in acute $\angle \beta$	(G)
	$C_{10}H_{15}O_4N$	Vanillyl α -naphthoylamide	M	Bi.	+		100° (calc.)		(24)
	$C_{10}H_{15}O_4N$	Methylcapsene	M.	Bi.					(24)
	$C_{10}H_{15}O_4$	Benzal benzilate	M.	Bi.	-	74° 10'	119° 46'	Ax. pl. $b(010)$; $X \wedge c = 101^\circ$ in obtuse $\angle \beta$	(G)
	$C_{10}H_{15}N_4Br$	Amazone hydrobromide	Trig	Un					(G)
	$C_{10}H_{15}N_4Cl$	Amazone hydrochloride	Trig.	Un.					(G)
	$C_{10}H_{15}$	Diphenyl- <i>p</i> -xylylene	M	Bi.	+	57° 43'			(G)
	$C_{10}H_{15}O_4N_4Br$	α -Bromostyrene	R.	Bi.	-		58°	Ax. pl. $a(100)$; $X \parallel c$	(G)
5492	$C_{10}H_{15}O_4N_4$	Styrene	M. (?)	Bi.					(37)
	$C_{10}H_{15}O_4N_4$	Triphenylamine nitrate	R	Bi.	-		15° 20' (red)	Ax. pl. $c(001)$; $X \parallel a$	(G)
5498	$C_{10}H_{15}O_6N$	Diacetylmorphine	R	Bi.	-		110°		(39)
	$C_{10}H_{15}O_4N_4$	β , β -Triethyl α methyleneundecidine prelate	M	Bi.	-		(apprx) 16° 7'		(G)
	$C_{10}H_{17}ON_4Br \cdot H_2O$	Cinchonine ethobromide	R	Bi.		87° 50'		Ax. pl. $b(010)$; $Z \parallel c$	(G)
	$C_{10}H_{17}ON_4Cl_2$	Dichloroandec- <i>p</i> -tolyl- β -phenylacide	M	Bi.	+		41° 40'	Ax. pl. $b(010)$	(G)
	$C_{10}H_{15}ON_4H_2O$	Cinchonidine hydroiodide ethiodide	M	Bi.			90°	Ax. pl. $\perp b(010)$	(G)
	$C_{10}H_{15}O_4N_4$	Quinidine methyl alcoholate	R	Bi.	+		78°	Ax. pl. $a(100)$; $Z \parallel c$	(G)
	$C_{10}H_{17}O_4N_4I$	Cinchonine hydroiodide ethyl alcoholate	R	Bi.	-		19°	Ax. pl. $b(011)$; $X \parallel c$	(G)
	$C_{10}H_{15}O_4$	<i>d</i> -Bornyl methylene ether	R	Bi.	+	75° 41'		Ax. pl. $b(010)$; $Z \parallel c$	(G)
	$C_{10}H_{15}O_4$	<i>p</i> -Cresolphthalen	R	Bi.	+	39°		Ax. pl. $c(001)$; $Z \parallel a$	(G)
	$C_{10}H_{17}ON$	α , β -Dibenzoylethylamine	R	Bi.		82° 40'		Ax. pl. $b(010)$; $Z \parallel a$	(G)
	$C_{10}H_{15}O_4N$	Benzoyl benzohydroxamic anisate (α -mod.)	M	Bi.	-		86° 30'		(G)
	$C_{10}H_{15}O_4N$	Amoyl benzohydroxamic <i>p</i> -toluate (β -mod.)	M	Bi.	+		100° 44'	Ax. pl. $b(010)$	(G)
	$C_{10}H_{15}N_4$	1, 3, 4-Triphenyltetrahydropyrazine	R	Bi.	+	56° 24'		Ax. pl. $a(100)$; $Z \parallel c$	(G)
	$C_{10}H_{15}O_4N_4$	Bisantipyrene	M	Bi.		60° 52'	98° 4'	Ax. pl. $b(010)$; $Z \wedge c = 37^\circ$ in obtuse $\angle \beta$	(G)
5704	$C_{10}H_{15}O_4N$	Narcotine	R.	Bi.	-		50° (apprx.)	Ax. pl. $a(100)$; $X \parallel c$	(G)

Index No.	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
5818	$C_{17}H_{15}O_4$	Benzyl santolate	R	B ₁	+	85° 57' (red)		Ax. pl. a(100); Z||c	(G)
	$C_{17}H_{15}ON_2 \cdot 2H_2O$	Cinchonidine ethoxide methiodide	R	B ₁		73° 30'		Ax. pl. b(010); Z||a	(G)
	$C_{17}H_{15}O_2N_2$	Quinidine ethyl alcoholate	R	B ₁			78° 30'	Ax. pl. b(010); Z||a	(G)
	$C_{17}H_{15}O_2N_2$	Menthyl thioxanthine anhydride	R	B ₁	-	83° 6'		Ax. pl. b(010); X||a	(G)
	$C_{17}H_{15}ONBr$	Bromomethyltriphenyl pyrrolone	M	B ₁	+	70° 15'	122° 55'	Ax. pl. \perp b(010); Z approx \perp a(101)	(G)
	$C_{17}H_{15}O_2N$	p-Tolyl anisohydroxamic benzoate (α -mod.)	M	B ₁	+	64° 32.5'	120° 38'	Ax. pl. \perp b(010); Z \wedge c = about 60° in obtuse $\angle\beta$	(G)
	$C_{17}H_{15}O_2N$	Anisoyl benzohydroxamic p-toluate (α -mod.)	M	B ₁	+	78° 50'		Ax. pl. \perp c(001); Z||a	(G)
	$C_{17}H_{15}O_2N$	Anisoyl p-toluidhydroxamic benzoate	M	B ₁		84° 55'		X||b	(G)
	$C_{17}H_{15}O_2N$	Benzoyl p-toluidhydroxamic anisate	M	B ₁		68° 32'	115°	Ax. pl. b(010), X \wedge c = 33° in obtuse $\angle\beta$	(G)
	$C_{17}H_{15}O_2N$	Benzoyl anisohydroxamic p-toluate	M	B ₁	+	71° 12'		Ax. pl. b(010)	(G)
	$C_{17}H_{15}O_2N$	Benzoyl anisohydroxamic anisate	M	B ₁	+		16° 42'	Ax. pl. \perp b(010); Z \wedge c = 53° 50' in obtuse $\angle\beta$	(G)
	$C_{17}H_{15}O_2N \cdot H_2O$	Methylene bisantipyrine	M	B ₁		76° 30'		Ax. pl. b(010); Z \wedge c = 56° in obtuse $\angle\beta$	(G)
	$C_{17}H_{15}ON \cdot H_2O$	Methyl trimethylcolchidimethanate methiodide	R	B ₁		72° (approx)		Ax. pl. a(100); Z||b	(G)
	$C_{17}H_{15}$	1, 3, 5-Triphenylbenzene	R	B ₁		9° 50'	18° 25'	Ax. pl. b(010); X||c	(G)
	$C_{17}H_{15}ON$	Ethyltriphenylpyrrolone (β -mod.)	M	B ₁			17° 20'	Ax. pl. \perp b(010); X \wedge c = 64° in obtuse $\angle\beta$	(G)
	$C_{17}H_{15}ON$	Propyltriphenylpyrrolone (α -mod.)	R	B ₁	+	67° 50'	135° 30'	Ax. pl. a(100); Z||c	(G)
	$C_{17}H_{15}O_2$	Lapranthine	M	B ₁				Ax. pl. b(010)	(G)
	$C_{17}H_{15}O$	Tetraphenylenequinoline	M	B ₁		80° (approx)		Ax. pl. b(010); X \wedge c = 50° (approx) in obtuse $\angle\beta$	(G)
	$C_{17}H_{15}O_2N$	d-Benzoylbulboepamine	R	B ₁		78° 34'	108° 58'	Ax. pl. c(001); X||b	(G)
	$C_{17}H_{15}O_2N_2$	Strychnine ethyl carbamate	?	B ₁	+		30° (approx)		(27)
	$C_{17}H_{15}O_2N_2$	Cinchonine phenylglycolate	R	B ₁	+			Ax. pl. b(010); Z||c	(G)
	$C_{17}H_{15}Br_2$	Cholestene dibromide (8 α -mod.)	R	B ₁	+		45°	Ax. pl. a(100); Z||c	(G)
	$C_{17}H_{15}O_4$	Stilbeneglycol dibenzoate	M	B ₁	+	87° 58'		Ax. pl. \perp b(010); Z||b	(G)
	$C_{17}H_{15}O_2N_2 \cdot 3H_2O$	Brucine valerianate	M	B ₁			80° (approx)	Ax. pl. \perp b(010)	(G)
5961	$C_{18}H_{26}O_2$	Gurjun resin	Tri	B ₁		80° 6'			(G)
	$C_{18}H_{34}O_2$	Cholesteryl formate	M	B ₁	+			Ax. pl. b(010); Z \wedge c = 21° 30'	(G)
	$C_{18}H_{16}O_4Na_2S_2$	α -Naphthylamine naphthalene-1, 5-disulfonate		B ₁					(1)
	$C_{18}H_{16}O_4Na_2S_2$	α -Naphthylamine naphthalene-1, 6-disulfonate	M ₁	B ₁	-		Large		(1)
	$C_{18}H_{16}O_4Na_2S_2$	α -Naphthylamine naphthalene-2, 6-disulfonate		B ₁	-		Large		(1)
	$C_{18}H_{16}O_4Na_2S_2$	α -Naphthylamine naphthalene-2, 7-disulfonate		B ₁	+				(1)
	$C_{18}H_{16}O_4Na_2S_2$	β -Naphthylamine naphthalene-1, 5-disulfonate (normal salt)		B ₁	+		75° 5' (obs.) 77° 6' (calc.)		(1)
	$C_{18}H_{16}O_4Na_2S_2$	β -Naphthylamine naphthalene-1, 5-disulfonate (acid salt)		B ₁			Large		(1)
	$C_{18}H_{16}O_4Na_2S_2$	β -Naphthylamine naphthalene-1, 6-disulfonate		B ₁	-		Large		(1)
	$C_{18}H_{16}O_4Na_2S_2$	β -Naphthylamine naphthalene-2, 6-disulfonate		B ₁	+		70° 5'		(1)
	$C_{18}H_{16}O_4Na_2S_2$	β -Naphthylamine naphthalene-2, 7-disulfonate		B ₁	-		Large	Bx ₀ \perp plates	(1)
	$C_{18}H_{16}$	d- α -Amyrilene	R	B ₁	+	72° 12'		Ax. pl. c(001); Z||a	(G)
	$C_{18}H_{16}$	d- β -Amyrilene	R	B ₁	+	22° 21.5'	35° 26.5'	Ax. pl. c(001); Z||b	(G)
	$C_{18}H_{16}O$	α -Isodynopinacoline	R	B ₁	+			Ax. pl. a(100); Z||c	(G)
	$C_{18}H_{16}$	Tetraphenylethanebenzene	M	B ₁			60° (approx)	Ax. pl. \perp b(010)	(G)
	$C_{18}H_{16}O_2$	Dynopinacone	M	B ₁			26° (approx)		(G)
	$C_{18}H_{16}O_{11}$	Tetrarin	Tri	B ₁	-		34° (approx)	Ax. pl. \perp a(100)	(G)
6062 1	$C_{18}H_{16}O_4N_2S_2 \cdot 7H_2O$	Morphine sulfate	R	B ₁	-		69° 37' (red)	Ax. pl. b(010); X||a	(G)
							56° 10'	Ax. pl. b(010); Z||a	(G)
6067	$C_{20}H_{32}O_{11}N$	Aconitine	R	B ₁	+				(G)
6075	$C_{20}H_{40}O_2$	Cholesterol benzoate	Tet.	Un					(G)
	$C_{20}H_{40}O_2NaSe$	Cinchonne selenate ethyl alcoholate	M	B ₁			77° 40'		(G)
	$C_{20}H_{40}O_4Na_2S_2 \cdot 3.5H_2O$	Amarine sulfate	M	B ₁	+		60° 57'	Ax. pl. \perp b(010); Z \wedge c = 80° in obtuse $\angle\beta$	(G)
	$C_{20}H_{40}O_4Na_2Se \cdot 5H_2O$	Strychnine selenate	M	B ₁	+		14°	Ax. pl. \perp b(010); Z \wedge c = 34° in acute $\angle\beta$	(G)
	$C_{20}H_{40}O_4Na_2S_2 \cdot 5H_2O$	Strychnine sulfate	M	B ₁	+		16° 30'	Ax. pl. \perp b(010); Z \wedge c = 32° 43' in obtuse $\angle\beta$	(G)
	$C_{21}H_{34}O_4$	Zeorine *	II	Un					(G)

LITERATURE

(For a key to the periodicals see end of volume)

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X-RAY DIFFRACTION DATA FROM CRYSTALS AND LIQUIDS

R. W. G. WYCKOFF

Introduction.—To find a given substance, consult Table A for all elementary substances, B for all chemical compounds, C for all alloys which are not definite chemical compounds, D for all liquids, and E for solid solutions of salts.

Except for the spacing observations given in Tables C' and E, there are recorded below only such observations as can be made to yield dimensions for at least a possible unit cell. The structure types of some of the simpler unit cells are shown in Figs. 1-11. The mode of designating these structures and other coordinate groups giving atomic positions is that described in Wyckoff, "The Structure of Crystals," Chemical Catalog Co., New York, 1924.

ABBREVIATIONS

2a, 4b, 8f, (4b, 4c), (4b, 4d), (32b, 48c), etc. refer to the correspondingly numbered coordinate groups in Wyckoff, l.c. and *Analytical Expression of the Results of the Theory of Space Groups* (Washington, 1922).

- a, b, c Edge length of unit cell along the a-, b-, and c-crystallographic axes, respectively.
 α The angle between the three equivalent axes of a rhombohedral unit, in a triclinic crystal, the angle between the b- and c-axes.
 B-c. Body-centered type of structure. The cubic B-c. arrangement (2a) is shown in Fig. 1.
 β Angle between the a- and c-axes.
 C-p. The hexagonal close-packed type of atomic arrangement (d) (see Fig. 3).
 γ Angle between the a- and b-axes in a triclinic crystal.
 2Ci Holohedral symmetry class, monoclinic system. 2Ci-m (C_{2h}^m) as under T.
 3Ci Second sort hexagonal tetartohedral symmetry class, rhombohedral division, hexagonal system. 3Ci-m (C_{3i}^m) and 3Ci-m (n) as under T.
 4C Tetartohedral symmetry class, tetragonal system. 4C-m (C_4^m) as under T.
 6Ci Paramorphic hemihedral symmetry class, hexagonal division, hexagonal system. 6Ci-m (C_{6h}^m) as under T.
 Dia. Diamond type (8f.) of atomic arrangement (see Fig. 4).
 2D Enantiomorphic hemihedral symmetry class, orthorhombic (rhombohedral) system. 2D-m (V_d^m) as under T.
 2Di Holohedral symmetry class, orthorhombic system. 2Di-m (V_d^m) and 2Di-m (n) as under T.
 3D Enantiomorphic hemihedral symmetry class, rhombohedral division, hexagonal system. 3D-m (D_3^m) and 3D-m (n) as under T.

- 3Di Holohedral symmetry class, rhombohedral division, hexagonal system. 3Di-m (D_{3d}^m) and 3Di-m (n) as under T.
 4d Second sort hemihedral symmetry class, tetragonal system. 4d-m (V_d^m) and 4d-m (n) as under T.
 4D Enantiomorphic hemihedral symmetry class, tetragonal system. 4D-m (D_4^m) as under T.
 4Di Holohedral symmetry class, tetragonal system. 4Di-m (D_{4h}^m) and 4Di-m (n) as under T.
 6Di Holohedral symmetry class, hexagonal division, hexagonal system. 6Di-m (D_{6h}^m) and 6Di-m (n) as under T.
 2c Hemimorphic hemihedral symmetry class, orthorhombic system. 2c-m (C_{2c}^m) as under T.
 3c Hemimorphic hemihedral symmetry class, rhombohedral division, hexagonal system. 3c-m (C_{3c}^m) and 3c-m (n) as under T.
 6c Hemimorphic hemihedral symmetry class, hexagonal division, hexagonal system. 6c-m (C_{6c}^m) and 6c-m (n) as under T.
 F-c. Face-centered type of structure. Cubic F-c. arrangement (4b) shown in Fig. 2.
 Oi Holohedral symmetry class, cubic system. Oi-m (O_h^m) and Oi-m (n) as under T.
 P. S. Possible structure. Used to designate those atomic arrangements which may be correct but for which additional results are needed or desirable.
 P. U. C. Possible unit cell. Used to designate those crystals for which the selected unit cells may be correct but which require additional experimental or theoretical treatment.
 S. P. Sample compressed.
 T Tetartohedral symmetry class, cubic system. T-m = m^{th} space group having this symmetry (= T^m). T-m (n) = n^{th} atomic arrangement under T-m. For instance T-3(c) is seen by reference to Wyckoff (*Analytical expression*, p. 122), to be arrangement 8a. Similarly 4Di-7 (c) is the coordinate pair $0\frac{1}{2}0$; $\frac{1}{2}00$ (*ibid.*, p. 93).
 Te Hemimorphic hemihedral (tetrahedral) symmetry class, cubic system. Te-m (T_d^m) and Te-m (n) as under T.
 Ti Paramorphic hemihedral (pyritohedral) symmetry class, cubic system. Ti-m (T_h^m) and Ti-m (n) have meanings analogous to those of similar symbols under T.
 u, or v Variable x, y or z parameter.

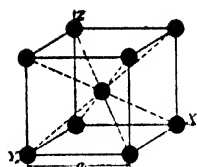


FIG. 1.—The unit cube of the body-centered cubic arrangement (2a). The coordinates of the atomic positions associated with this cell are 000; $\frac{1}{2}\frac{1}{2}\frac{1}{2}$.

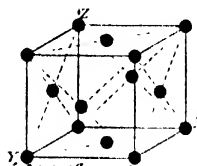


FIG. 2.—The unit cube of the face-centered cubic arrangement (4b). The coordinates of the atomic positions associated with this cell are 000; $\frac{1}{2}\frac{1}{2}0$; $\frac{1}{2}0\frac{1}{2}$; $0\frac{1}{2}\frac{1}{2}$.

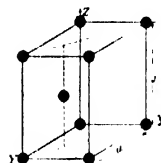


FIG. 3.—The unit cell of the hexagonal close-packed arrangement (d). The coordinates of the atomic positions associated with this cell are 000; $\frac{1}{3}\frac{2}{3}\frac{1}{2}$.



FIG. 4.—The unit cube of the diamond cubic arrangement (8f). The coordinates of the atomic positions associated with this cell are 000; $\frac{1}{2}\frac{1}{2}0$; $\frac{1}{2}0\frac{1}{2}$; $0\frac{1}{2}\frac{1}{2}$; $\frac{1}{4}\frac{1}{4}\frac{1}{4}$; $\frac{1}{4}\frac{3}{4}\frac{3}{4}$; $\frac{3}{4}\frac{1}{4}\frac{3}{4}$; $\frac{3}{4}\frac{3}{4}\frac{1}{4}$.

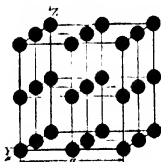


FIG. 5.—The unit cube of the NaCl-arrangement (4b, 4c). The atoms in positions 4b are shown as annuli; those in 4c as black circles. The coordinates of 4c are $0\frac{1}{2}0$; $\frac{1}{2}00$; $00\frac{1}{2}$; $\frac{1}{2}\frac{1}{2}\frac{1}{2}$.

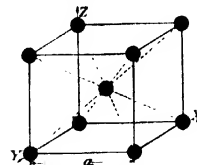


FIG. 6.—The unit cube of the CsCl-arrangement (1a, 1b). Atoms of one sort, in 1a, are shown as annuli; the other kind of atom, in 1b, appears as a black circle.

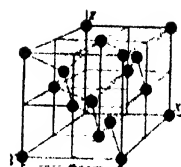


FIG. 7.—The unit cube of the ZnS-arrangement (4b, 4d). The atoms in position 4d appear as black circles; their coordinates are $\frac{1}{4}\frac{1}{4}\frac{1}{4}$; $\frac{1}{4}\frac{3}{4}\frac{3}{4}$; $\frac{3}{4}\frac{1}{4}\frac{3}{4}$; $\frac{3}{4}\frac{3}{4}\frac{1}{4}$.

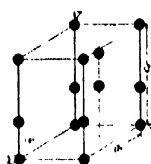


FIG. 8.—The unit cell of the ZnO-arrangement (c'). The coordinates of equivalent atomic positions are 000; $\frac{2}{3}\frac{1}{3}\frac{1}{2}$ and $00c$; $\frac{2}{3}\frac{1}{3}c + \frac{1}{2}$.

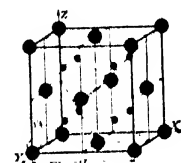


FIG. 9.—The unit cell of the CaF₂-arrangement (4b, 8c). The atoms in positions 8c, shown as black circles, have the coordinates $\frac{1}{4}\frac{1}{4}\frac{1}{4}$; $\frac{1}{4}\frac{3}{4}\frac{3}{4}$; $\frac{3}{4}\frac{1}{4}\frac{3}{4}$; $\frac{3}{4}\frac{3}{4}\frac{1}{4}$; $\frac{1}{4}\frac{1}{4}\frac{3}{4}$; $\frac{1}{4}\frac{3}{4}\frac{1}{4}$; $\frac{3}{4}\frac{1}{4}\frac{1}{4}$; $\frac{3}{4}\frac{3}{4}\frac{3}{4}$.

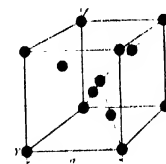


FIG. 10.—The unit cube of the Cu₂O-arrangement (2a, 4d). The atoms in positions 4d are shown as annuli; those in 2a appear as black circles.

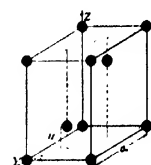


FIG. 11.—The unit cell of the hexagonal Mn(OH)₂-arrangement (h). The coordinates of the equivalent atomic positions in the unit are 000 and $\frac{1}{3}\frac{2}{3}u$; $\frac{2}{3}\frac{1}{3}u$.

Chemical symbol	Crystal system	Structure type	Space group	Unit cell		Molecules	Calculated density	Lit. and remarks
				Size, Å				
				<i>a</i> ₀	<i>c</i> ₀			
A	C.	F.-c. (4b)		5.43		4	1.645	(227) (temp. ca. -253°)
Ag	C.	F.-c. (4b)		4.079		4	10.49	(82, 142, 165, 218, 235, 240, 241, 265, 329, 371)
Al	C.	F.-c. (4b)		4.043		4	2.692	(84, 127, 128, 141, 197, 206, 216, 241, 329, 366, 361)
As	H.	3Di-5(c)	3Di-5	4.142; 54° 7'		2	5.75	(43, 366) u. = 0.226, probably correct
Au	C.	F.-c. (4b)		4.064		1	19.4	(82, 84, 142, 165, 218, 241, 329, 371)
Be	H.	C.-p. (d)	6Di-4?	2.283	3.607	2	1.828	(163)
Bi*	H.	3Di-5(c)	3Di-5	4.726; 57° 16'		2	9.86	(82, 118, 139, 140, 142, 166, 193)
C-dia.	C.	Dia. (8f)	Oh-7	3.56		8	3.51	(52, 59, 60, 128)
Graph. †	H.	6c-4(a, b)	6c-4?	2.46	6.79	4	2.22	(14, 88, 89, 105, 119, 128, 262, 310)
Ca	C.	F.-c. (4b)		5.56		1	1.538	(134, 135)
Cd	H.	C.-p. (d)	6Di-4?	2.98	5.63	2	8.56	(134, 136, 229)
Ce	C.	F.-c. (4b)		5.12		1	6.90	(137)
	H.	C.-p. (d)	6Di-4?	3.65	5.96	2	6.73	(137). Existence (?) (224)
Co	C.	F.-c. (4b)		3.554		1	8.67	(131, 136), cf. (224)
	H.	C.-p. (d)	6Di-4?	2.514	4.105	2	8.66	(131, 136), cf. (224)
Cr	C.	B.-c. (2a)		2.875		2	7.22	(131, 136, 201, 206)
Cu	C.	F.-c. (4b)		3.603		1	8.95	(46, 82, 84, 141, 145, 196, 197, 198, 199, 200, 329, 374, 371)
Fe-α	C.	B.-c. (2a)		2.855		2	7.92	(82, 84, 122, 128, 131, 168, 196, 250, 253, 254, 255, 256, 362)
Fe-β	C.	B.-c. (2a)		2.90 at 800°		2	7.55	
Fe-γ	C.	F.-c. (4b)		3.63 at 1100°		4	7.70 at 1100°	No structural inversion, α to β (250, 253, 254, 255, 256, 257)
Fe-δ	C.	B.-c. (2a)		3.68 at 1425°		4	7.40 at 1425°	
Ga				2.93 at 1425°		2	7.33	
Ge	C.	Dia. (8f)		Symmetry said to be not cubic		8	5.38	(285)
Hf	H.	C.-p. (d)	6Di-4?	5.62	5.46	2	11.3	(14, 138)
Hg								(324, 379)
In	Tet.?	?		4.58	4.86	4	7.43	(2, 170)
Ir	C.	F.-c. (4b)		3.823		4	22.8	(134, 136) P. U. C.
K	C.	B.-c. (2a)		5.20 at -150°		2	0.917 at -150°	(134, 136, 284)
Li	C.	B.-c. (2a)		3.50		2	0.534	(162). Approximate only
Mg	H.	C.-p. (d)	6Di-4?	3.22	5.23	2	1.709	(32, 33, 128)
Mn (α)	C.?			8.89		56?	7.21	(36, 128, 129, 196)
Mn (β)	C.?			6.289		20?	7.29	(350) P. U. C.
Mn (γ)	Tet.?			3.774	3.533	4	7.21	(350) P. U. C.
Mo	C.	B.-c. (2a)		3.143		2	10.26	(350, 368) P. U. C.
Na	C.	B.-c. (2a)		4.30		2	0.954	(82, 136, 236, 329)
Nb	C.?			1.19		1		(128)
Ni	C.	F.-c. (4b)		3.499		4	9.04	(366) P. U. C. Impure
Os	H.	C.-p. (d)		2.714	4.32	2	22.8	(36, 82, 84, 128, 131, 136, 168, 206, 260, 299, 329, 360, 361)
P (black)	H.			5.96; 60° 16'		8		(137)
Pb	C.	F.-c. (4b)		1.920		4	11.48	(392) P. S. like As
Pd	C.	F.-c. (4b)		3.859		4	12.25	(82, 84, 156, 196, 206, 241, 329, 340)
Pt	C.	F.-c. (4b)		3.913		1	21.5	(134, 136, 164, 167, 329, 393)
Rh	C.	F.-c. (4b)		3.820		4	12.2	(82, 134, 136, 142, 329, 393)
Ru	H.	C.-p. (d)	6Di-4?	2.686	4.272	2	12.6	(136, 393)
S	R.		2Di-24	10.61	24.56	128	2.02	(134, 136)

Chemical symbol	Crystal system	Structure type	Space group	Unit cell			Calculated density	Lit. and remarks
				Size Å		Molecules		
				a_0	c_0			
Te	H.	3D-4(a) or 3D-6(a)	3D-4 or 3D-6	4.44	5.90	3	6.26	(42, 232, 308, 366) $u = 0.269$. P. S.
Th	C.	F.-c. (4b)		5.04		4	12.0	(36, 137)
Ti	H.	C.-p. (d)	6Di-4?	2.92	4.67	2	4.58	(36, 137, 201)
Tl	H.?	C.-p. (d)?	6Di-4(?)	3.47	5.52	2	11.7	(25, 156). Correct unit uncertain
U	Tet. (?)			4.75	5.40			
V	C.	B.-c. (2a)		Said to be not cubic				(25)
W	C.	B.-c. (2a)		3.04		2	5.98	(138)
Zn	H.	C.-p. (d)	6Di-4?	3.155		2	19.3	(67, 82, 84, 87, 136, 374)
Zr	H.	C.-p. (d)	6Di-4?	2.657	4.948	2	7.04	(134, 136, 206, 229, 346)
				3.23	5.14	2	6.47	(137, 379)

* $u = 0.237$. (142, 61 early editions) give incorrect structures

† u for 6d-4 (a) = 0. u for 6d-4 (b) = $\frac{1}{4}$

B-TABLE.—STANDARD ARRANGEMENT P. p. 96

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å			Calculated density	Lit.	Additional data and remarks
				a_0	c_0	M			
H ₂ O	H.			4.52	7.32	4	0.918	(54, 90, 114, 210, 212)	P. U. C. Atomic arrangement not yet known with certainty.
HCl	C.	F.-c. †		5.50, -168°C		4	1.45	(228)	$u_0 = 0.228$, distance O-N = 1.06 Å. P. S. $u = 0.22$
11 NaO	C.	(4f)	T-4	5.77		4	1.51	(232, 238)	
NH ₃	C.	[4f, T-4(b)]		5.19 (ca. -80°)		4	0.81	(238)	$u_N = \text{ca. } 0.04$, $u_{Cl} = 0.27$
NH ₄ Cl (high)	C.	NaCl-like	T-4	6.51 (250°)		4	1.27	(29)	
NH ₄ Cl (low)	C.	CaCl ₂ -like		3.868		1	1.528	(30, 130, 244, 280)	$b_0 = 10.58$ $u = 0.40 \pm 0.01$
NH ₄ Br	C.	FeS ₂ -like (8A, 8A)	Ti-6	7.89		4	1.41	(281)	
NH ₄ Br (high)	C.	NaCl-like		6.90 (250°)		4	1.97	(30)	N atoms at 4d.-12(a); P at 4d.-12(b)
NH ₄ Br (low)	C.	CaCl ₂ -like		4.047		1	2.438	(30, 130, 244)	
NH ₄ I	C.	NaCl-like		7.244		4	2.517	(30, 130, 243)	$u_{AS} = 0.898$, $v_0 = 0.21$ $u_{NB} = 0.888$, $v_0 = 0.23$ u_0 uncertain. Liquid air-temperature
(NH ₄) ₂ SO ₄	R.		2Dh-16	5.95	7.73	4	1.80	(133)	
12 PH ₄ I	Tet.	4Dh-7(a, c)	4Dh-7	6.34	4.62	2	2.88	(84)	$u_{AS} = 0.898$, $v_0 = 0.21$ $u_{NB} = 0.888$, $v_0 = 0.23$ u_0 uncertain. Liquid air-temperature
(NH ₄) ₂ PO ₄	Tet.		4d-12	7.48	7.55	4	1.80	(242)	
As ₂ O ₃	C.	(32b, 48c)	Oh-7	11.06		16	3.86	(41)	$u_{AS} = 0.898$, $v_0 = 0.21$ $u_{NB} = 0.888$, $v_0 = 0.23$ u_0 uncertain. Liquid air-temperature
Sb ₂ O ₃	C.	(32b, 48c)	Oh-7	11.14		16	5.57	(41)	
16 CO ₂	C.	(4b, 8A)	Ti-6	5.62		4	1.64	(217, 218, 288, 282)	

For other carbon compounds belonging here v. the C-Table *infra*

SiO ₂ (β-quartz)	H.	6D-4 } (c, j) 6D-5 }	6D-4 & 6D-5	5.01	5.47	3	2.50	(221, 222, 289)	$u = 0.197$
SiO ₂ (low quartz)	H.		3D-3 & 3D-5 or 3D-4 & 3D-6	4.903	5.308	3	2.648	(21, 48, 168, 227, 231)	P. U. C. a_0 -spacing for quartz very accurately determined.
SiO ₂ (β-cristobalite)	C.	(8f, 16b)	Oh-7 †	7.12 (290°)		8	2.20	(288, 277, 280)	$u_F = 0.205$ Complex structure assigned C at 6C-6(a) if $u = 0$ and 6C-6(b), if $u = \frac{1}{2}$ and $\frac{1}{2}$. Si at 6C-6(a) if $u' = \frac{1}{2}$ and 6C-6(b) if $u' = 0.29$ and 0.95 P. S.
(NH ₄) ₂ SiF ₆	C.	(4b, 8a, 24a)	Oh-5	8.38		4	2.00	(28)	
SiC, I	H.			3.098	37.9	15	3.15	(282)	C at 000; 00 $\frac{1}{2}$; $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$. Si at 00 $\frac{1}{2}$; 0, 0, $u + \frac{1}{2}$; $\frac{1}{2}$, $\frac{1}{2}$, $u + \frac{1}{2}$, $\frac{1}{2}$, $u + \frac{1}{2}$, $u = \text{ca. } \frac{1}{10}$. P. S.
SiC, II	H.		6C'-6 †	3.098	15.17	6	3.15	(247, 248)	
SiC, III	H.			3.098	10.10	4	3.16	(290)	
TiO ₂ (rutile)	Tet.	4Di-14(a, f)	4Di-14	4.58	2.98	2	4.21	(22, 112, 241, 242)	P. U. C.
TiO ₂ (anatase)	Tet.			5.27	9.37	8	4.05	(242)	
Ti ₂ O ₃	H.	3Dh-6(c, e)	3Dh-6	5.37, 56° 48'		2	4.67	(241)	The later determination gives $a_0 = 4.40$ The later determination gives $a_0 = 4.60$
TiN	C.	NaCl (4b, 4c)		4.237		4	5.40†	(12, 206)	
TiC	C.	NaCl (4b, 4c)		4.297		4	5.01†	(12, 206)	P. S. Other data (83) conflict. 2 modifications?
21 ZrO ₂	C.	CaF ₂ (4b, 8c)	Oh-5	5.08		4	6.19	(12)	
ZrS ₂	H.	Mn(OH) ₂ (A)	3Dh-3	3.68	5.85	1	3.73	(12)	P. S. $u = \text{ca. } 0.25$
ZrSe ₂	H.	Mn(OH) ₂ (A)	3Dh-3	3.79	6.18	1	5.36	(12)	P. S. $u = \text{ca. } 0.25$
ZrN	C.	NaCl (4b, 4c)		4.61		4	7.1	(12, 206)	P. S.
(NH ₄) ₂ ZrF ₆	C.	(4d, 4e, 12a, 24u)	Oh-4	9.35		4	2.28	(12)	$0.15 < u_N < 0.21$; $0.42 < u_F < 0.48$, $0.23 < v_F < 0.28$
ZrC	C.	NaCl (4b, 4c)		4.78		4	6.4	(12, 206)	P. S.
ZrSiO ₄	Tet.			9.20	5.87	8	4.85	(241)	P. U. C.

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å		M	Calculated density	Lit.	Additional data and remarks
				a_0	c_0				
SnO	Tet.	4Dh-7(a, c)?		3.77	4.77	2	6.54	(300)	
SnO_2	Tet.			4.72	3.16	2	7.07	(32, 241, 262)	
SnI_4	C.	Ti-6(c, d)	Ti-6	12.28		8	4.52	(96, 178)	P. U. C.
$(\text{NH}_4)_2\text{SnCl}_6$	C.	(4b, 8c, 24a)	Oh-5	10.08		4	2.39	(82)	$u_{\text{Sn}} = 0.120$, $u_{\text{Cl}} = 0.258$, $z = 0.009$, $y = 0.001$, $x = 0.258$
22 PbO	Tet.	4Dh-7(a, c)		3.99	5.01	2	9.28	(97, 300)	$u_{\text{Cl}} = 0.248$ and < 0.25
PbO_2	Tet.	4Dh-14(a, f)	4Dh-14	4.97	3.40	2	9.40	(245, 300)	$u_{\text{Pb}}[4Dh-7(c)] = 0.24$
$\text{PbFe}(\beta)$	C.	(NaFe)(4b, 8c)	Oh-5	5.93		4	7.76	(340)	
PbS	C.	NaCl (4b, 4c)		5.97		4	7.49	(61, 76, 184, 340, 357)	
PbSe	C.	NaCl (4b, 4c)		6.14		4	8.17	(357, 366)	
PbTe	C.	NaCl (4b, 4c)		6.34		4	8.67	(387)	
$\text{Pb(NO}_3)_2$	C.	(4b, 8a, Ti-9(24))	Ti-6	7.84		4	4.54	(191, 248)	
ThO_2	C.	(NaCl)(4b, 8c)	Oh-5	5.59		4	9.98	(12, 82, 111)	Another determination of a_0 (288) varies widely from this.
Ga_2O_3	H.	3Dh-6(c, e)	3Dh-6	5.281, 5.57, 3.57		2	6.62	(381)	
In_2O_3	C.		Oh-10	10.12		16	7.07	(381)	
$(\text{Ga, In})_2\text{O}_3$	C.		Oh-10	9.78		16		(381)	
TiCl_3	C.		Oh-10	10.57		16	10.2	(381)	39 mol. % In_2O_3
TiCl	C.	(NaCl)(1a, 1b)	Oh-1	3.84		1	6.98	(88, 239, 369)	
TiBr	C.	(NaCl)(1a, 1b)	Oh-1	3.97		1	7.44	(339, 369)	
ZnO	H.	ZnO (e)	6c-4	3.25	5.23	2	5.61	(4, 7, 81, 61, 121, 349)	
$\text{Zn(BrO}_3)_2 \cdot 6\text{H}_2\text{O}$	C.	(4b, 8a, Ti-9(24))	Ti-6	10.31		4	2.59	(276)	
$\alpha\text{-ZnS}$ (wurtzite)	H.	ZnO (e)	6c-4	3.84		2	4.01	(9, 81, 381)	$u_{\text{S}} = \text{ca. } \frac{1}{2}$
$\beta\text{-ZnS}$ (blende)	C.	ZnS (4b, 4d)	Te-2	5.43		4	4.02	(47, 102, 108, 184)	
ZnSe	C.	ZnS (4b, 4d)	Te-2	5.65		4	5.29	(80)	
ZnCO_3	H.	3Dh-6(a, b, e)	3Dh-6	5.62, 4.87, 2.37		2	4.54	(160)	
29 CdO	C.	NaCl (4b, 4c)		4.72		4	8.06	(86, 317)	
CdF_2	C.	(NaF)(4b, 8c)	Oh-5	5.40		4	6.30	(240)	
CdI_2	H.	Mn(OH)_2 (h)	3Dh-3	4.24	6.84	1	5.67	(28)	$0.23 < u_{\text{I}} < 0.253$
$\alpha\text{-CdS}$	H.	ZnO (e)	6c-4	4.14	6.72	4	4.78	(81, 381)	$u_{\text{S}} = \text{ca. } \frac{1}{2}$
$\beta\text{-CdS}$	C.	ZnS (4b, 4d)	Te-2	5.82		4	4.84	(381)	
Hg_2Cl_2	Tet.	4Dh-17(e)		4.47	10.89	2	7.16	(344)	$u_{\text{Hg}} = \frac{1}{2}$, $u_{\text{Cl}} = \frac{1}{2}$ P. S.
Hg_2Br_2	Tet.	4Dh-17(e)		4.05	11.10	2	7.71	(344)	$u_{\text{Hg}} = \frac{1}{2}$, $u_{\text{Br}} = \frac{1}{2}$ P. S.
HgI_2	Tet.			4.356	12.34	2	6.40	(397)	
Hg_2I_2	Tet.	4Dh-17(e)		4.92	11.61	2	7.08	(344)	$u_{\text{Hg}} = \frac{1}{2}$, $u_{\text{I}} = \frac{1}{2}$ P. S.
HgS (metacinnabarite)	C.	ZnS (4b, 4d)	Te-2	5.84		4	7.71	(150, 181, 184, 236, 227, 368, 366)	
HgS (cinnabar)	H.		3D-4 & 3D-6	4.16	9.54	3	8.12	(180, 287, 288, 266)	P. S. suggested
CuO	Tri.			3.74	4.67	4	6.48	(188)	P. S. This suggested structure resembles NaCl . $b_0 = c_0$, $\alpha = 85^\circ 21'$, $\beta = 88^\circ 25'$, $\gamma = 93^\circ 35'$
Cu_2O	C.	Cu_2O (2a, 4d)	Oh-4	4.28		2	6.02	(61, 113, 188)	
CuCl	C.	ZnS (4b, 4d)	Te-2	5.46		4	4.15	(76, 293)	
CuBr	C.	ZnS (4b, 4d)	Te-2	5.78		4	4.96	(76, 293)	
CuI	C.	ZnS (4b, 4d)	Te-2	6.07		4	5.62	(8, 76, 293)	
Cu_2Se	C.	(CuF)(4b, 8c)	Oh-5	5.75		4	7.18	(80)	
Cu_2ZnO	C.			4.01				(24) cf (197)	Correctness in doubt
32 Ag_2O	C.	Cu_2O (2a, 4d)	Oh-4	4.72		2	7.27	(76, 88, 161, 377)	
AgCl	C.	NaCl (4b, 4c)		5.54		4	5.56	(76, 364, 265)	
AgBr	C.	NaCl (4b, 4c)		5.77		4	6.45	(76, 364, 265)	
AgI	H.	ZnO (e)	6c-4	4.59	7.50	2	5.66	(6, 8, 268)	
Ag_2PO_4	C.	ZnS (4b, 4d)	Te-2	6.40		4	5.67	(76, 264, 268)	
Ag_3AsO_4	C.	(2a, 6f, 8a)	Te-4	6.00		2	6.37	(287)	
(4AgI:CuI) micromite	C.	(2a, 6f, 8a)	Te-4	6.12		2	6.66	(287)	
$(\text{NH}_4)_2\text{PtCl}_6$	C.	ZnS (4b, 4d)	Te-2	6.38		4		(8)	A solid solution of AgI and CuI. Exact composition unknown
PtAs_2 (sperryite)	C.	(4b, 8c, 24a)	Oh-5	9.84		4	3.08	(292)	$0.22 < u_{\text{Cl}} < 0.24$
$(\text{NH}_4)_2\text{PdCl}_6$	Tet.	FeS_2 (4b, 8a)	Ti-6	5.94		4		(287)	Composition unknown
MnO	C.	4Dh-1(a, c, j)	4Dh-1	7.21	4.26	1	2.12	(98)	$u_{\text{Cl}} = 0.23$
MnO_2	Tet.	NaCl (4b, 4c)		4.40		4	5.50	(187)	
				4.44	2.89	2	5.04	(314)	
Mn(OH)_2	H.	Mn(OH)_2 (h)	3Dh-3	3.34	4.68	1		(2)	Pyrolusite gives the same pattern as polianite
MnS	C.								Dimensions of this unit calculated from the density $\rho = 3.26$.
MnSe	C.	NaCl (4b, 4c)		5.21		4	4.06	(372)	$u_{\text{O}} = \text{ca. } 0.22$
		FeS_2 (4b, 8a)	Ti-6	6.18		4		(104, 106)	$u_{\text{S}} = 0.40$. Size of unit cell calculated from the best available density. [$\rho = 3.88(185)$]
MnCO_3	H.	3Dh-6(a, b, e)	3Dh-6	5.84, 4.77, 4.57		2	3.79	(47, 270)	C atoms at (a); $u_{\text{S}} = 0.27$
43 FeO	C.	NaCl (4b, 4c)		4.294		4	5.99	(322)	
Fe_2O_3	H.	3Dh-6(c, e)	3Dh-6	5.42, 5.57, 1.77		2	5.28	(61, 81, 181, 208, 381)	$u_{\text{Fe}} = 0.105 \pm 0.001$; $u_{\text{O}} = 0.292 \pm 0.007$
Fe_3O_4	C.	(8f, 16c, 32b)	Oh-7	8.37		8	5.21	(80, 121, 189, 394)	$u_{\text{O}} = \text{ca. } 0.37$
FeS (troilite)	H.	6c-4(a, b)		3.43	5.79	2	4.90	(388, 391)	If $u_{\text{Fe}} = 0$, $u_{\text{S}} = \text{ca. } \frac{1}{2}$. If $u = \frac{1}{2}$ exactly, the space group is 6Dh-4

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, mm, Å		M	Calculated density	Lat.	Additional data and remarks
				a_0	c_0				
FeS ₂ (pyrite)	C.	FeS ₂ (4b, 8A)	Ti-6	5.38		4	5.08	(47, 106, 106, 287)	$u_S = 0.388$
FeS + S ₈	H.	6c-4(a, b)		3.43	5.68	2		(366, 391)	Artificial and natural pyrrhotites containing excess sulfur
FeSe	H.	6c-4(a, b)		3.61	5.87	2		(366)	39.4% Fe (weight)
FeSe + Se ₈	H.	6c-4(a, b)		3.51	5.55	2		(366)	35.0% Fe (weight)
Fe(S, Se)	H.	6c-4(a, b)		3.54	5.91	2		(366)	49.8% (weight) Fe, 12.0% S, 38.2% Se
(NH ₄) ₂ FeF ₆	C.	(4b, 4c, 8c, 24a)	Oh-5	9.10		4	1.96	(302)	N atoms at (4c) and (8c). 0.187 < u_F < 0.217, best around 0.21
NH ₄ Fe(BO ₂) ₂ ·12H ₂ O	C	(4b, 4c, 8A, 8A, Ti-6 (24))	Ti-6	12.14		4	1.81	(348)	
FeC	R.			4.52	6.74	4	7.67	(8, 9, 7, 284, 281)	Cementite and cohenite are identical in structure. Atomic arrangement unknown. $b_0 = 8.07$ C atoms at (e); $u_C = 0.37$ probably
FeCO ₃	H.	3Di-6(a, b, c)	3Di-6	5.82, 47° 45'		2	3.86	(47, 270)	Probably tetartohedral; atomic arrangement unknown
FeSi	C.			4.48		4	6.16	(207)	P. U. C., structure unknown
FeSi ₂	Tet.			2.69	5.08	1	5.02	(307)	Fe atoms at (e). $u_S = ca. 0.31$. Probably correct structure.
FeCuSi ₂	Tet	4i-5(r, a, g)†	4i-5 7	5.23	5.15	2		(66, 118)	
CoO	C.	NaCl(4b, 4c)		4.24		4	6.49	(381)	
CoS	H.	6c-4(a, b)		3.37	5.11	2	5.94	(366)	
CoAsS	C.	FeS ₂ -like(4f)	T-4	5.65		4	6.07	(122, 287)	Reflection microscopic results (161) suggest that this structure may not be correct
(Fe, Co)S (synthetic)	H.	6c-4(a, b)		3.36	5.29	2		(366)	Composition = ca. 50 atomic % FeS
45 NiO	C.	NaCl(4b, 4c)		4.172		4	6.78	(74, 66, 289, 281, 302, 360)	
NiS (synthetic)	H.	6c-4(a, b)		3.42	5.30	2	5.58	(366)	$u_S = ca. \frac{1}{2}$ taking $u_{Ni} = 0$
NiS (millierite)	H.	3c-5(b, b)	3c-5	5.64, 116° 30'		3		(366)	Possible atomic positions are suggested
NiS ₂	C ?			4.08		1		(366)	P. U. C.
NiSe	H	6c-4(a, b)		3.66	5.31	2		(366)	
Ni(NO ₃) ₂ ·6NH ₃	C.	(4b, 8A, Ti-6(24))	Ti-6	10.96		4	1.43	(278)	u_N in (8A) = $ca. \frac{1}{2}$, u_F and $u_H = ca. 0$, u_O and $u_S = ca. \frac{1}{2}$. $u_N = 0.24$
NiCl ₂ ·6NH ₃	C.	(4b, 8c, 24a)	Oh-5	10.08		4	1.49	(274)	
NiBr ₂ ·6NH ₃	C.	(4b, 8c, 24a)	Oh-5	10.48		4	1.84	(274)	
NiI ₂ ·6NH ₃	C.	(4b, 8c, 24a)	Oh-5	11.01		4	2.05	(274)	$u_N = 0.24$
NiAs	H.	6c-4(a, b)		3.61	5.03	2		(6, 268, 281)	Nicolite from Eisleben.
NiAsS (gersdorffite)	C.	FeS ₂ -like(4f)	T-4	5.68		4		(357, 366)	
NiSb	H.	6c-4(a, b)		3.92	5.11	2	8.78	(366, 281)	For the mineral breithauptite from Androsberg $a_0 = 3.90$, $c_0 = 5.09$
NiSbS (ullmannite)	C.	FeS ₂ -like(4f)	T-4	5.91		4		(387)	Composition unknown
(Ni, Fe)S (synthetic)	H.	6c-4(a, b)		3.408	5.540	2		(366)	S = 37.8%, Fe = 33.9%, Ni = 28.3% (weight)
(Ni, Fe)S (synthetic)	H.	6c-4(a, b)		3.408	5.434	2		(366)	S = 38.4%, Fe = 28.7%, Ni = 32.8% (weight)
(Ni, Fe)S (pentlandite)	C.		Oh-5 7	10.06		32		(366)	(8f, 24a, 32a) with u_{Fe} (24a) = $ca. \frac{1}{2}$ and $u_S = ca. \frac{1}{2}$ gives fair agreement. Various compositions
Cr ₂ O ₃	H.	3Di-6(c, e)	3Di-6	5.38, 54° 58'		2	5.28	(381)	
MoS ₂	H	6Di-4(c, f)	6Di-4	3.15	12.30	2	5.00	(99, 211)	$u_S = 0.02$
(NH ₄) ₂ MoO ₄ F ₂	C.	(4b, 4c, 8c, 24a)	Oh-5 7	9.10		4	2.23	(302)	N atoms at (4c) and (8c). F + O at (24a). 0.194 < u_{F+O} < 0.220
PbMoO ₄	Tet.			3.85	6.02	1		(81)	P. U. C.
Ag ₂ MoO ₄	C.	(8f, 16c, 32b)	Oh-7	9.26		8	6.28	(276)	0.34 < u_O < 0.40
49 UO ₂	C.	CaF ₂ (4b, 8c)	Oh-5	5.47		4	10.89	(12, 111)	
UO ₂ (NO ₃) ₂ ·6H ₂ O	R.		2Di-17	13.15	11.42	4	2.75	(86, 204)	U atoms probably at 2Di-17 (e) with $u = 0.13$. $b_0 = 8.02$
V ₂ O ₅	H.	3Di-6(c, e)	3Di-6	5.43, 53° 53'		2	5.09	(381)	
VN	C.	NaCl(4b, 4c)		4.28		4	5.47	(366)	
VC	C.	NaCl(4b, 4c)		4.30		4	5.28	(366)	
CbN	C.	NaCl(4b, 4c)		4.41		4	8.26	(366)	
CbC	C.	NaCl(4b, 4c)		4.40		4	8.14	(366)	
TaN	H.	ZnO(a')	6c-4	3.05	4.94	2	16.2	(12)	P. S. Cf. (287) which gives conflicting results
TaC	C.	NaCl(4b, 4c)		4.58		4	11.7	(12, 206)	
B ₂ H ₂	H.			4.54	8.69	2	0.589	(249)	B atoms probably at 6Di-4 (f) with $u = ca. 0.10$. Temperature not stated
55 Al ₂ O ₃	H.	3Di-6(c, e)	3Di-6	5.12, 53° 17'		2	3.96	(81, 81, 181, 206, 281)	The α -form. $u_{Al} = 0.105 \pm 0.001$; $u_O = 0.303 \pm 0.003$

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å		M	Calculated density	Lit.	Additional data and remarks
				a	c				
AlN	H.	ZnO(c)	6c-4	3.11	4.98	2	3.24	(198)	$u = 0.38 \pm 0.01$
(NH ₄) ₂ AlF ₆	C	(4b, 4c, 8a, 24a)	Oh-5	8.40		4	2.17	(202)	N atoms at (4c) and (8a). $0.194 < u_p < 0.200$
NH ₄ Al(BO ₂) ₃ ·12H ₂ O	C.	(4b, 4c, 8a, 8b, Ti-6 (24))	Ti-6	12.0a		4	1.76	(248, 252)	
AlF ₃	C.	ZnS(4b, 4d)	Te-2	6.13		4	4.26	(298)	
Al ₂ F ₆ (BO ₂) ₃ topas	R		2Dh-16	4.64	8.37	4		(198)	Topas from San Luis Potosi, Mexico: $b_0 = 8.78$
CuAl	H.	F-c?		3.80, 94° 36'		4		(141, 197, 258)	This structure may be incorrect
Cu ₂ Al	C.	F-c.		3.47		4		(34) cf. (141)	Probably incorrect
Cu ₂ Al ₂ (Fe ²⁺ , Mn ²⁺) ₂ Al ₂ (SiO ₃) ₂ (garnet)	Tet.	B-c.		6.05	4.88	4	4.35	(141, 197, 258)	Atomic arrangement unknown
NiAl	C.	CuCl(1a, 1b)?		11.4a		8		(198)	87 atomic % of ferrous iron
66 Se ₂ O ₃	C.		Oh-10	2.82		1	6.2a	(24)	More work needed
SeN	C.	NaCl(4b, 4c)		9.79		16	3.89	(381)	
(Se, In) ₂ O ₃	C.		Oh-10	4.44		4	4.4a	(306)	
(Al, Se) ₂ O ₃	C.		Oh-10	9.90		16		(381)	66.8 mol. % Se ₂ O ₃
Y ₂ O ₃	C.		Oh-10	9.22		16		(381)	Composition unknown
Y ₂ PO ₄	Tet.		Oh-10	10.56		16	5.07	(381)	
(Yt, Th) ₂ O ₃	C.		Oh-10	9.60	5.94	8	4.44	(242)	P. U. C.
(Yt, Bi) ₂ O ₃	C.		Oh-10	10.53		16		(381)	50 weight % Y ₂ O ₃
La ₂ O ₃	H.			10.72		16		(381)	37.4 mol % Bi ₂ O ₃
CeO ₂	C.	CaF ₂ (4b, 8a)	Oh-5	3.94a	6.15a	1	6.4a	(381)	
Ce ₂ O ₃	H.			5.41		4	7.1a	(82, 111)	
60 Pr ₂ O ₃	H.			3.88a	6.057	1	6.8a	(381)	
Pr ₂ O ₃	H.			3.85a	5.99a	1	7.07	(381)	
Pr ₂ O ₃	C.			10.98		1		(382)	
Nd ₂ O ₃	H.			3.84a	6.00a	1	7.2a	(381)	P. U. C.
Nd ₂ O ₃	C.		Oh-10	10.85		16	7.21	(381)	
Eu ₂ O ₃	C.		Oh-10	10.84		16	7.2a	(381)	
Gd ₂ O ₃	C.		Oh-10	10.79		16	7.6a	(381)	
66 Tb ₂ O ₃	C.		Oh-10	10.70		16	7.0a	(381)	
Tb ₂ O ₃ ?	C.			10.55		?		(382)	
Dy ₂ O ₃	C.		Oh-10	10.63		16	8.2a	(381)	P. U. C. "Brown terbium oxide"
Ho ₂ O ₃	C.		Oh-10	10.58		16	8.3a	(381)	
Er ₂ O ₃	C.		Oh-10	10.54		16	8.6a	(381)	
Tm ₂ O ₃	C.		Oh-10	10.52		16	8.77	(381)	
Yb ₂ O ₃	C.		Oh-10	10.39		16	9.3a	(381)	
La ₂ O ₃	C.		Oh-10	10.37		16	9.4a	(381)	
(NH ₄) ₂ ZrF ₆	C.	(4d, 4e, 12a, 24a)	Oh-4	9.40		4		(117)	Contains 15% (NH ₄) ₂ ZrF ₆
78 BeO	II	ZnO(c)	6c-4	2.70	4.39	2	2.98	(109, 163, 232, 244)	u_0 ca. 1/2
BeO(C ₂ H ₅ O) ₂	C.			15.7a		8	1.38	(66, 62)	A possible atomic arrangement suggested
BeO(C ₂ H ₅ O) ₂	M.			16.0a	9.1a	2	1.26	(62)	P. U. C. $b_0 = 9.7a$, $\beta = 116^\circ 7'$
MgO	C.	NaCl(4b, 4c)		4.20a		4	3.59	(86, 107, 109, 110, 121, 133, 223, 271, 287)	
Mg(OH) ₂	H.	Mn(OH) ₂ (h)	3Dh-3	3.11	4.73	1	2.43	(3, 5, 159)	$u_p = 0.30$
MgF ₂	Tet.	4Dh-14(a, f)	4Dh-14	4.66	3.08	2	3.11	(328, 345, 367)	
MgS	C.	NaCl(4b, 4c)		5.08		4	2.84	(136)	
MgCO ₃	H.	3Dh-6(a, b, c)	3Dh-6	5.61, 48° 12'		2	3.10	(140)	
Mg ₂ Si	C.	CaF ₂ (4b, 8a)	Oh-5	6.39		4	1.94	(298)	
Mg ₂ Se	C.	CaF ₂ (4b, 8a)	Oh-5	6.78		4	3.64	(202, 270)	
Mg ₂ Pb	C.			6.75		4	5.47	(370)	
(Mg, Fe ²⁺) ₂ SiO ₄ olivine	R.		2Dh-5	4.77	6.00	4		(28, 213)	Structure probably CaF ₂ (4b, 8a)
Al ₂ Mg ₃	C.			4.80			2.62	(24)	14 atomic % of ferrous iron.
MgAl ₂ O ₄	C.	(8f, 16c, 32b)	Oh-7	8.07		8		(80, 189)	$b_0 = 10.28$
77 CaO	C.	NaCl(4b, 4c)		4.79		4	3.37	(79, 86, 107, 109)	More work needed
Ca(OH) ₂	H.	Mn(OH) ₂ (h)	3Dh-3	3.52	4.93	1	2.31	(158)	$u_0 = 0.37$. Value of a_0 calculated from the best available density ($\rho = 3.57$)
CaF ₂	C.	CaF ₂ (4b, 8a)	Oh-5	5.46		4	3.17	(47, 76, 107, 108)	
CaS	C.	NaCl(4b, 4c)		5.68		4	2.60	(79, 126)	
CaSO ₄	R.		2Dh-17	6.21	6.96	4		(326)	Anhydrite, not analysed. $b_0 = 6.95$
CaSeO ₄ ·6H ₂ O	Tri.							(18)	Some unreduced measurements have been recorded for this salt
CaSe	C.	NaCl(4b, 4c)		5.91		4	3.81	(79)	
Ca(NO ₃) ₂	C.	(4b, 8a, Ti-6(24))	Ti-6	7.60		4	2.47	(248)	
Ca ₂ (F, Cl)Ca ₂ (PO ₄) ₂ apatite	H.		6C ₂ 2	9.41	6.88	2		(122)	Composition unknown
CaCO ₃ (calcite)	H.	3Di-6 (a, b, c)	3Di-6	6.36, 48° 6'		2		(67, 49, 179, 221, 270)	C atoms at (a). $u_0 = 0.25$. A wave length standard
CaCO ₃ (aragonite)	R.	2Dh-16(c, c, c, d)?	2Dh-16	4.94	5.72	4	2.94	(86, 286)	A possible atomic arrangement has been suggested. $b_0 = 7.94$
Ca(HCOO) ₂	R.		2Dh-5?	10.16	6.20	8	2.03	(323)	P. U. C.
CaTiO ₃	C?			7.68		8		(348)	P. U. C. (?) More work necessary
CaWO ₄	Tet.			3.64	6.64	1		(91)	P. U. C.

Chemical symbol	Crystal system	Structure	Space group	Unit cell, \AA		M	Calculated density	Lit	Additional data and remarks
				a	c				
$\text{CaMg}(\text{CO}_3)_2$ (dolomite)	H.	$3\text{C}_2\text{-}2(a, b, c, f)$	$3\text{C}_2\text{-}2$	6 02, 477 7'		1	2 84	(61, 289, 312)	
$\text{CaMg}(\text{SiO}_3)_2$ (diopside)	M.		$2\text{C}_2\text{-}6$	9 71	5 24	4	3 28	(281)	$b_0 = 8.89, \beta = 74^\circ 10'$
$\text{Ca}(\text{Mg, Fe})(\text{CO}_3)_2$	H.	$3\text{C}_2\text{-}2(a, b, c, f)$	$3\text{C}_2\text{-}2$	6 02, 477 7'		1		(289)	30 atomic % of ferrous iron
78 SrO	C.	$\text{NaCl}(4b, 4c)$		5 10		4	5 13	(187, 199)	
SrF_2	C.	$\text{CaF}_2(4b, 8c)$	$\text{O}_h\text{-}5$	5 86		4	4 12	(13)	
SrCl_2	C.	$\text{CaF}_2(4b, 8c)$	$\text{O}_h\text{-}5$	7 00		4	3 05	(241)	
SrS	C.	$\text{NaCl}(4b, 4c)$		5 87		4	3 90	(128)	
SrSe	C.	$\text{NaCl}(4b, 4c)$		6 23		4	4 55	(230, 231, 268)	
$\text{Sr}(\text{NO}_3)_2$	C.	$(4b, 8a, \text{Ti-}6(24))$	$\text{Ti-}6$	7 81		4	2 93	(101, 248)	
BaO	C.	$\text{NaCl}(4b, 4c)$		5 50		4	6 08	(107, 109)	
BaF_2	C.	$\text{CaF}_2(4b, 8c)$	$\text{O}_h\text{-}5$	6 20		4	4 86	(76)	
BaS	C.	$\text{NaCl}(4b, 4c)$		6 35		4	4 37	(128)	
BaSO_4	R.		$2\text{Dh-}16$	8 898	7 170	4	4 432	(1, 200, 226, 227, 228, 229)	$b_0 = 5.448$
BaSe	C.	$\text{NaCl}(4b, 4c)$		6 62		4	4 93	(231, 268)	
$\text{Ba}(\text{NO}_3)_2$	C.	$(4b, 8a, \text{Ti-}6(24))$	$\text{Ti-}6$	8 11		4	3 23	(101, 248)	Approx atomic positions are said to be $u_{\text{N}} = x_0$ and $y_0 = \text{ca. } \frac{1}{2}$. $z_0 = \text{ca. } 0$
81 Li_2O	C.	$\text{CaF}_2(4b, 8c)$	$\text{O}_h\text{-}5$	4 61		4	2 01	(38)	
LiH	C.	$\text{NaCl}(4b, 4c)$		4 10		4	0 76	(34)	
LiF	C.	$\text{NaCl}(4b, 4c)$		4 01		4	2 65	(76, 88, 132, 267)	
LiCl	C.	$\text{NaCl}(4b, 4c)$		5 14		4	2 00	(78, 104, 218)	
LiBr	C.	$\text{NaCl}(4b, 4c)$		5 49		4	3 46	(78, 104, 218)	
LiI	C.	$\text{NaCl}(4b, 4c)$		6 00		4	4 08	(78, 104, 218, 224)	
Li_2S	C.	$\text{CaF}_2(4b, 8c)$	$\text{O}_h\text{-}5$	5 70		4	1 04	(230)	
$\text{Li}_2\text{C}_2\text{O}_4$	R?			6 58	6 61	4	2 15	(28)	$b_0 = 7.74$. P. U. C.
LiCH_3O	M?			7 61	4 87	4	1 53	(28)	$b_0 = 6.03, \beta = 95^\circ 42'$. P. U. C., S. P.
$\text{LiC}_2\text{H}_3\text{O}_2$	R?			12 86	7 43	12	1 17	(28)	$b_0 = 11.68$. P. U. C., S. P.
$\text{LiC}_2\text{H}_5\text{O}_2$	R?			16 94	9 45	16	1 08	(28)	$b_0 = 12.15$. P. U. C., S. P.
$\text{LiC}_4\text{H}_7\text{O}_2$ crotonate	H?			24 8	10 7	48	1 27	(28)	P. U. C., S. P.
$\text{LiC}_4\text{H}_7\text{O}_2$ butyrate	H?			27 7	10 1	48	1 07	(28)	P. U. C., S. P.
$\text{LiC}_4\text{H}_7\text{O}_2$ isobutyrate	Tet?			10 78	9 28	24	1 01	(28)	P. U. C., S. P.
$\text{LiC}_4\text{H}_7\text{O}_2$ valerate	Tet?			24 5	9 4	32	1 01	(28)	P. U. C., S. P.
$\text{LiC}_4\text{H}_7\text{O}_2$ isovalerate	R?			11 70	6 93	4	1 00	(28)	$b_0 = 8.70$. P. U. C., S. P.
$\text{LiC}_4\text{H}_7\text{O}_2$ trimethylacetate	C?			18 58		36	1 00	(28)	P. U. C., S. P.
$\text{LiC}_7\text{H}_{11}\text{O}_2$ heptylate	Tet?			27 4	9 3	32	1 02	(28)	P. U. C., S. P.
$\text{LiC}_8\text{H}_{13}\text{O}_2$ caprylate	H?			42 1	10 9	72	1 05	(28)	P. U. C., S. P.
$\text{LiC}_9\text{H}_{15}\text{O}_2$ nonylate	Tet?			36 6	9 3	48	1 04	(28)	P. U. C., S. P.
$\text{LiC}_{10}\text{H}_{17}\text{O}_2$ undecylate	H?			62 0	9 5	72	0 90	(28)	P. U. C., S. P.
$\text{LiC}_{11}\text{H}_{19}\text{O}_2$ undecylate	Tet?			41 8	9 2	48	0 94	(28)	P. U. C., S. P.
$\text{LiC}_{12}\text{H}_{21}\text{O}_2$ laurate	Tet?			28 3	11 7	24	0 87	(28)	P. U. C., S. P.
$\text{LiC}_{13}\text{H}_{23}\text{O}_2$ oleate	H?			64 6	9 5	72	0 99	(28)	P. U. C., S. P.
$\text{LiC}_{14}\text{H}_{25}\text{O}_2$ stearate	H?			62 5	9 8	72	1 04	(28)	P. U. C.
82 NaF	C.	$\text{NaCl}(4b, 4c)$		4 62		4	2 81	(78, 78, 209)	
NaHF_2	H.	$3\text{Dh-}5(a, b, c)?$	$3\text{Dh-}5$	5 17, 39' 41'		1	2 01	(211)	Na at (a), $u_F = 0.42$. P. R.
NaCl	C.	$\text{NaCl}(4b, 4c)$		5 628		4		(44, 48, 47)	One of the fundamental wave length standards
NaClO_2	C.	$(4f, 4f, \text{T-}4(12))$	$\text{T-}4$	6 56		4	2 40	(88, 142, 144, 147, 148, 149, 246, 247, 288)	$u_{\text{Na}} = \text{ca. } 0.00, u_{\text{Cl}} = \text{ca. } 0.41$. Different positions have been suggested for the O atoms
NaBr	C.	$\text{NaCl}(4b, 4c)$		5 94		4	3 24	(78, 78, 272)	$u_{\text{Na}} = \text{ca. } 0.00, u_{\text{Br}} = \text{ca. } 0.41$. Different positions have been suggested for the O atoms
NaBrO_2	C.	$(4f, 4f, \text{T-}4(12))$	$\text{T-}4$	6 71		4	3 30	(88, 142, 148, 149, 153, 246, 247)	
NaI	C.	$\text{NaCl}(4b, 4c)$		6 46		4	3 67	(78, 78, 272)	
Na_2S	C.	$\text{CaF}_2(4b, 8c)$	$\text{O}_h\text{-}5$	6 53		4	1 85	(230)	
NaN_3	H.	$3\text{Dh-}5(a, b, c)$	$3\text{Dh-}5$	5 481, 38' 43'		1	1.838	(208)	$u = 0.428$
NaNO_2	H.	$3\text{Dh-}6(a, b, c)$	$3\text{Dh-}6$	6 32 48' 0"		2	2 19	(47, 287)	N atoms at (a). $u_0 = 0.25$
$\text{NaH}(\text{C}_2\text{H}_3\text{O}_2)_2$	C.		$\text{Ti-}77$	15 98		24	1 38	(279)	
$\text{NaC}_2\text{H}_3\text{O}_2$ v. Table C'	C.							(202)	Apparently very complicated
$\text{NaSb}(\text{AlO}_3)_2$	H.	$6\text{Dh-}4(a \text{ or } b, d, f, \text{etc.})$	$6\text{Dh-}4$	5 40	8 81	2		(10)	$u_{\text{Al}} < 0.10$; O positions not known
83 KF	C.	$\text{NaCl}(4b, 4c)$		5 33		4	2 53	(78, 78, 122, 272)	
KHF_2	Tet.	$4\text{Dh-}18(a, h)$	$4\text{Dh-}18$	5 67	6 81	4	2 35	(40)	$u_F = 0.14 \pm 0.01$. The H atoms may have arrangement $4\text{Dh-}18(d)$
KCl	C.	$\text{NaCl}(4b, 4c)$		6 280		4	1 987	(44, 78, 78, 120)	
KBr	C.	$\text{NaCl}(4b, 4c)$		6 576		4	2 760	(44, 78, 120, 272)	
KI	C.	$\text{NaCl}(4b, 4c)$		7 052		4	3 124	(88, 70, 71, 78, 78, 120, 122, 272, 282, 286)	
K_2O	M.			9 36		4		(88, 70, 71)	P. U. C. b_0 and c_0 approx. = a_0 , and β approx. = 90° . $b_0 = 10.01$
K_2SO_4	R.		$2\text{Dh-}16$	5 73	7 42	4	2.70	(102, 276)	$u = 0.138$
KN_3	Tet.	$4\text{Dh-}18(a, d, h)$	$4\text{Dh-}18$	6 094	7.056	4	2.046	(288)	K atoms at $4\text{Dh-}12(a)$; P at $4\text{Dh-}12(b)$
KH_2PO_4	Tet.		$4\text{Dh-}12$	7 40	6 96	4	2.36	(242)	
KCN	C.	NaCl-like		6 55		4	1 53	(27, 72, 72)	

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å		M	Calculated density	Lit.	Additional data and remarks
				<i>a</i>	<i>c</i>				
KCNO	Tet.			6.07 ₈	7.03 ₀	4	2.06 ₈	(300)	Structure similar to KN ₃ <i>b</i> ₀ = 15.74
KH ₂ C ₂ O ₄ Cl (H chloromaleate)	R.		2D-16(?)	7.62	10.95	8		(308)	
KC ₂ H ₂ O ₄ s. Table C'									
K ₂ SeCl ₄	C.	(4b, 8c, 24a)	Oh-5	9.96		4	2.74	(93)	<i>u</i> _{Cl} = 0.24 ₈ and < 0.25
K ₂ Zn(CN) ₄	C.	(8f, 16c, 32b)	Oh-7	12.54		8	1.66	(92)	<i>u</i> _C = ca. 0.34, <i>u</i> _N = ca. 0.40, $\frac{1}{2}(u_C + u_N) = 0.37$
K ₂ Cd(CN) ₄	C.	(8f, 16c, 32b)	Oh-7	12.84		8	1.84	(92)	$\frac{1}{2}(u_C + u_N) = 0.37$
K ₂ Hg(CN) ₄	C.	(8f, 16c, 32b)	Oh-7	12.7 ₈		8	2.43	(92)	$\frac{1}{2}(u_C + u_N) = 0.37$
K ₂ PtCl ₄	Tet.	4Dh-1(<i>a</i> , <i>c</i> , <i>j</i>)	4Dh-1	6.99	4.13	1	3.40	(98)	0.233 < <i>u</i> _{Cl} < 0.238
K ₂ PtCl ₄	C.	(4b, 8c, 24a)	Oh-5	9.7		4	3.8	(219, 220)	Assigned value, <i>u</i> _{Cl} = 0.16, prob- ably incorrect
K ₂ PdCl ₄	Tet.	4Dh-1(<i>a</i> , <i>c</i> , <i>j</i>)	4Dh-1	7.04	4.10	1	2.65	(98)	<i>u</i> _{Cl} = 0.23
KCr(8O ₄) ₂ ·12H ₂ O	C	(4b, 4c, 8a, 8b, Ti-6 (24))	Ti-6	11.9 ₈		4	1.97	(248)	
KAl(8O ₄) ₂ ·12H ₂ O	C	(4b, 4c, 8a, 8b, Ti-6 (24))	Ti-6	12.0 ₈		4	1.81	(189, 227, 248, 252)	
KAlSi ₃ O ₈ (sclularia)	M		2C1-3	8.57	7.23	4		(314)	<i>b</i> ₀ = 13.01, $\beta = 116^\circ 7'$ Com- position unknown
KLi8O ₄	H.		6C 6?	5.13	8.60	2	2.39	(320)	P. U. C. An atomic arrangement is suggested
84 RbF	C?	CaCl(1a, 1b)?		3.66?		17		(78, 209, 294)	Structure probably incorrect
RbCl	C.	NaCl(4b, 4c)		6.571		4	2.81 ₂	(78, 102, 272, 266)	
RbBr	C.	NaCl(4b, 4c)		6.86 ₈		4	3.56 ₉	(74, 76, 120)	
RbI	C.	NaCl(4b, 4c)		7.32 ₅		4	3.56 ₆	(77, 78, 120, 272)	
Rb ₂ SO ₄	R.		2Dh-16	5.95	7.78	4	3.66	(192)	<i>b</i> ₀ = 10.3 ₉
CaF	C.	NaCl(4b, 4c)		6.01		4	4.6 ₂	(78, 209)	
CaCl	C.	CaCl(1a, 1b)	Oh-1	4.11 ₀		1	3.99 ₉	(78, 88, 120)	
CaBr	C.	CaCl(1a, 1b)	Oh-1	4.29		1	4.45	(77, 78, 272)	
CaI	C.	CaCl(1a, 1b)	Oh-1	4.56 ₂		1	4.51 ₄	(69, 70, 71, 78, 272)	
Ca ₂	R.			6.82	11.01	4	4.51	(177, 178, 179, 228)	<i>b</i> ₀ = 9.9 ₈
Ca ₂ Cl ₂	H.	3Dh-5(<i>a</i> , <i>b</i> , <i>c</i>)	3Dh-5	5.46; 70° 42'		1	3.88	(268)	1 probably at (<i>b</i>); <i>u</i> _{Cl} = 0.31
CaBr ₂	R.		2Dh-16	6.57	10.66	4	4.29	(177, 178, 179, 228)	<i>b</i> ₀ = 0.18
Ca ₂ SO ₄	R.		2Dh-16	6.22	8.20	4	4.30	(192)	<i>b</i> ₀ = 10.8 ₈
Tourmaline	H.		3c-1 3c-2	16.2 ₈	7.2 ₄			(152)	P. U. C. Composition unknown
R'AlSi ₃ O ₈ and R''Al ₂ Si ₂ O ₇ , Tri. and M								(118)	Unreduced powder- and Laue- photographs have been prepared from various feldspars

C-Table.—THE C-ARRANGEMENT. See ALSO TABLE C' infra

Chemical formula	Name	Crystal system	Unit cell, size, Å			M	Calculated density	Lit.	Remarks
			<i>a</i>	<i>b</i>	<i>c</i>				
CH ₄ N ₂ O	Urea	Tet.	5.03		4.7 ₀	2	1.33	(28, 178)	Space group 4d-3
C ₂ H ₂ O ₄	Oxalic acid	R.	6.46	7.70	0.02	4	1.96	(318)	Space group 2Dh-15
CaH ₆	Ethane	H.	4.46		8.19	2	0.70 ₈	(240)	C atoms probably at 6Di-4(<i>f</i>) with <i>u</i> = ca. 0.10 Temperature not stated.
C ₂ H ₄ N ₂ O	N-Methylurea	R.	5.03	5.64	4.70	4?		(171)	Space group 2Dh-4?
C ₂ H ₅ NO	Acetaldehyde ammonia	H.	8.18, $\alpha = 84^\circ 50'$			6		(171, 218)	Space group 3Di-5?
C ₂ H ₂ O ₄	Oxalic acid dihydrate	M	6.05	3.57	11.0	2	1.08	(318)	Space group 2C1-5. $\beta = 106^\circ 12'$
C ₂ H ₄ N ₂ O	1, 2-Dimethylurea	R.	4.53	10.0	5.14	2		(171)	Space group 2e-7?
C ₂ H ₂ O ₄	Maleic anhydride	R.	6.58	11.48	5.00	4	1.44	(28)	P. U. C., S. P.
C ₂ H ₃ O ₄	Acetylenedicarboxylic acid	M?	7.88	9.04	6.62	4	1.70	(28)	$\beta = 111^\circ 6'$. P. U. C., S. P.
C ₂ H ₄ NIO ₄	Iodoaceticimide	Tet.	6.29		15.58	4	2.41	(308)	P. U. C. Space group 4C-2 and 4C-4?
C ₂ H ₂ O ₄	Succinic anhydride	R.	6.95	11.64	5.41	4	1.51	(288)	P. U. C., cf. (28)
C ₂ H ₂ O ₄	Maleic acid	M	7.49	10.14	7.12	4	1.46	(28, 209)	$\beta = 117^\circ 7'$. Space group 2C1-5(?)
C ₂ H ₄ NO ₂	Succinimide	R.	7.50	9.60	12.75	8	1.42	(288)	P. U. C. Space group 2Di-1?
C ₂ H ₂ O ₄	Fumaric acid	T.	7.56	15.00	6.20	6		(288)	$\alpha = 90^\circ 40'$, $\beta = 88^\circ 30'$, $\gamma = 89^\circ 48'$
C ₂ H ₂ O ₄	Succinic acid	M.	5.07	8.92	5.53	2		(288)	$\beta = 91^\circ 20'$. P. U. C., cf. (28)
C ₂ H ₂ O ₄	dl-Tartaric acid	Tri	14.8 ₂	9.74	4.90	4		(17)	$\alpha = 82^\circ 20'$, $\beta = 122^\circ 56'$, $\gamma = 111^\circ 52'$. P. U. C.
C ₂ H ₂ O ₄	d-Tartaric acid	M	7.70		6.20	2	1.76	(18)	$\beta = 100^\circ 17'$, cf. (28)
C ₂ H ₄ N ₂ O ₄	Pentaerythritol tetranitrate	Tet.	13.2		6.66	4	1.80	(292)	Space group 4Di-7
C ₂ H ₄ O ₄	Pentaerythritol	Tet.	6.16		8.76	2		(28, 179, 298)	Space group 4c-9
C ₂ H ₄ N ₂ O ₄	α -Dinitrobenzene	M.	7.95	13.0	7.45	4		(28)	$\beta = 112^\circ 7'$. P. U. C.
C ₂ H ₄	Quinone	M.	11.46	6.43	6.85	4	1.40	(28)	$\beta = 93^\circ 20'$. P. U. C., S. P.
C ₂ H ₄	Benzene	R.	9.76	7.39	6.85	4	1.04	(94, 101, 278)	P. U. C., measurements at -20°C
C ₂ H ₂ O ₄	Resorcinol	R.	9.56	10.2 ₈	5.64	4		(28, 28)	P. U. C., cf. (28)
C ₂ H ₂ O ₄	Hydroquinol	M	13.5 ₈	5.22	8.13	4		(28)	$\beta = 107^\circ$. P. U. C.
(C ₂ H ₄ O ₄) _x	Cellulose and starch	H	10.9 ₂		7.55	6	1.39	(28)	P. U. C., Latter S. P.

Powder photographs have been obtained and possible units have been suggested

Chemical formula	Name	Crystal system	Unit cell, size, Å			M	Calculated density	Lit.	Remarks
			a	b	c				
C ₆ H ₁₂ N ₄	Hexamethylenetetramine	C.	7.02			2	1.33s	(100, 112)	$v_N = \text{ca. } 0.12, u_O = \text{ca. } 0.33s$. Structure type (No. 12a); space group T_d-4
C ₆ H ₁₂ O ₆	d(β)-Mannitol	R.	10.3s	8.1	4.5s	2	1.55	(27)	P. U. C.
C ₇ H ₆ O ₂	Benzoic acid	M.	5.44	5.18	21.6	4		(28)	$\beta = 97^\circ 5'$, P. U. C.
C ₈ H ₇ NO ₄	Ammonium hydrogen fumarate	T.	7.00	7.44	6.56	2		(306)	$\alpha = 107^\circ 1'$, $\beta = 117^\circ 58'$, $\gamma = 69^\circ 16'$
C ₈ H ₇ ClN ₂ O ₄	Ammonium chlorofumarate	M.	9.30	6.70	6.73s	2		(308)	$\beta = 108^\circ 25'$, Space group $3C-2(?)$.
C ₈ H ₆ O ₄	Salicylic acid	M.	11.5s	11.2s	4.93	4	1.58	(28)	$\beta = 91^\circ 22'$, P. U. C.
C ₈ H ₁₀ O ₄	α-Methyl glycoside	R.	10.8s	14.6s	5.61	4	1.46	(28)	P. U. C.
C ₈ H ₆ O ₃	o-Phthalic anhydride	R.	7.74	13.6s	5.86	4	1.54	(28)	P. U. C., S. P.
C ₈ H ₆ O ₃	o-Phthalic acid	M.	9.33	7.13	5.10	2	1.60	(28) cf. (21)	$\beta = 94^\circ 36'$, P. U. C., S. P.
C ₈ H ₆ O ₄	Malealdehyde	Tet.	10.30	4.10		8		(171, 318)	Space group $4C-5?$
C ₈ H ₆ O ₃	trans-Cinnamic acid	M.	11.6s	14.1s	4.26	4	1.40	(28)	$\beta = 98^\circ 36'$, P. U. C., S. P.
C ₈ H ₆ O ₃	Hydrocinnamic acid	M.	12.9s	9.20	6.98	4	1.23	(28)	$\beta = 103^\circ 36'$, P. U. C., S. P.
C ₁₀ H ₈	Naphthalene	M.	8.34	5.98	8.68	2		(28, 27)	$\beta = 122^\circ 44'$, P. U. C., cf. (28)
C ₁₀ H ₈ O	α-Naphthol	M.	13.1	4.9	13.4	4	1.22	(28)	P. U. C., $\beta = 117^\circ 10'$
C ₁₀ H ₈ O	β-Naphthol	M.	11.70	4.28	17.4	4	1.22	(28)	P. U. C., $\beta = 119^\circ 48'$
C ₁₀ H ₈	Acenaphthene	R.	8.32	14.1s	7.26	4	1.19	(28)	P. U. C.
C ₁₀ H ₈ N ₂	Asobenzene	M.	12.5s	5.28	8.38	2	1.23	(28)	$\beta = 116^\circ$, P. U. C.
C ₁₀ H ₈ N ₂	Hydrazobenzene	R.	11.1s	9.93	9.33	4	1.17	(28)	P. U. C., S. P.
C ₁₀ H ₁₂ O ₁₁	Saccharose	M.	10.6s	8.7s	8.0s	2	1.57	(27)	$\beta = 105^\circ 44'$, P. U. C.
C ₁₀ H ₁₆ O ₂	Lauroic acid	Tet.?	28.3		11.4	24	0.86	(28)	P. U. C., S. P. See Table C'.
C ₁₀ H ₈ O ₂	Anthraquinone	R.	12.0s	15.0s	2.60	2	1.40	(28)	P. U. C., S. P.
C ₁₀ H ₁₀	Anthracene	M.	8.58	6.02	11.18	2	1.25	(28, 27)	$\beta = 125^\circ$, P. U. C., cf. (28)
C ₁₀ H ₁₀	Phenanthrene	M.	9.56	6.72	7.55	2	1.18	(28)	$\beta = 92^\circ$, P. U. C., S. P.
C ₁₀ H ₁₀ O ₂	Benzil	H.	8.15		13.4s	3	1.41	(27)	P. U. C.
C ₁₀ H ₁₀	Stilbene	M.	9.6	8.9	12.6	4	1.25	(27)	$\beta = 118^\circ 40'$, P. U. C.
C ₁₀ H ₁₀	Dibenzyl	M.	12.7	6.1	7.4	2	1.18	(27)	$\beta = 110^\circ$, P. U. C.
C ₁₀ H ₁₆ O ₂	Myristic acid	H?	57.4		11.4	72	0.83	(28)	P. U. C., see Table C'.
C ₁₀ H ₁₂ N ₂ O ₂	Indigotin	H.	20.2		12.1s	12	1.20	(28)	P. U. C., Measurements also on S. P.
C ₁₀ H ₁₆ O ₂	Palmitic acid	H?	60.6		11.6	72	0.88	(28)	P. U. C., see Table C'.
C ₁₀ H ₁₆ O ₂	Elaidic acid	Tet.?	26.5		10.8	16	0.98	(28)	P. U. C., S. P., see Table C'.
C ₁₀ H ₁₆ O ₂	Stearic acid	H?	62.0		10.7	72	0.94	(28)	P. U. C., S. P., see Table C'.
C ₁₀ H ₁₆	Triphenylmethane	R.	14.5s	25.6s	7.42	4		(28, 26) cf. (177, 178)	
C ₁₀ H ₁₆ O	Triphenylcarbinol	H.	16.5		8.8	6	1.23	(27)	P. U. C.
C ₁₀ H ₁₆ O ₂	α, α'-Distearin	H?	81.5		10.8	48	0.82	(28)	P. U. C., S. P.

C'-TABLE.—LONG CHAIN COMPOUNDS

Arrangement by Classes

1. Aliphatic Hydrocarbons (320, 401)

Formula	Maximum spacing, Å	Spacings of broad lines, Å						
		d_1	d_2	d_3	d_4	d_5	d_6	d_7
C ₁₇ H ₃₆	24.3	4.25	3.93		2.54	2.32		
C ₁₈ H _{38α}	25.9		4.0					
C ₁₈ H _{38β}	23.9	4.58	3.80	3.66	2.61			2.05
C ₁₉ H ₄₀	26.9	4.22	3.84		2.52	2.25		
C ₂₀ H _{42α}	28.0		3.9					
C ₂₀ H _{42β}	26.2	4.63	3.82	3.61	2.50	2.12		2.03
C ₂₁ H ₄₄	29.45	4.17	3.77	3.01	2.50	2.25		
C ₂₁ H ₄₆	32.2							
C ₂₄ H ₅₀	33.05	4.18	3.80	3.02	2.50	2.25		
C ₂₇ H ₅₆	37.1	4.17	3.77	3.01	2.51	2.25		
C ₃₁ H ₆₄	43.0	4.14	3.74	2.99	2.40	2.21		
C ₃₁ H ₇₂	47.7							

Formula	Max. spacing	Formula	Max. spacing
C ₂₇ H ₅₆ (?)	30.6	C ₃₀ H ₆₂	40.4
C ₂₈ H ₆₀	32.9	C ₃₁ H ₆₄	41.6*
C ₂₈ H ₆₂	34.3		42.9†
C ₂₈ H ₆₄	35.6	C ₃₂ H ₆₆	42.7
C ₂₈ H ₆₆	37.7	C ₃₄ H ₇₀	45.3
C ₂₉ H ₆₀	39.4		

Specimens for (320) pressed, those for (401) melted on glass plates only.

* Melted.

† Pressed.

2. Aromatic Hydrocarbons

C₂₄H₄₈, Octadecylbenzene, d₁ = 49.2, (228)

3. Aliphatic Acids

a. Monobasic

Formula	Name	Maximum spacing, Å	Broad line spacing, Å				Lit.
			d ₁	d ₂	d ₃	d ₄	
CH ₃ CO ₂	Formic	5.19					(309)
C ₂ H ₃ CO ₂	Acetic	6.66					(309)
C ₃ H ₅ CO ₂	Propionic	6.75	4.03			3.43	(309)
C ₄ H ₇ CO ₂	Butyric	9.65	4.09	3.65		3.45	(309)
C ₅ H ₉ CO ₂	Valeric	10.1(?)					(309)
C ₆ H ₁₁ CO ₂	Caproic	14.6	4.14	3.65		3.47	(309)
C ₇ H ₁₃ CO ₂	Heptonic	16.4	4.29	3.75	3.97	3.49	(309)
C ₈ H ₁₅ CO ₂	Caprylic	19.0	4.14	3.65		3.48	(309)
C ₉ H ₁₇ CO ₂	Nonylic	22.9	4.22	3.71	3.97	3.48	(309)
C ₁₀ H ₁₉ CO ₂	Capric	23.3	4.14	3.73			(309)
C ₁₁ H ₂₁ CO ₂	Undecylic	25.8					(184)
C ₁₂ H ₂₃ CO ₂	Lauric	27.0	4.11	3.68			(184)
C ₁₃ H ₂₅ CO ₂	Myristic	32.2	4.12	3.72			(184)
C ₁₄ H ₂₇ CO ₂	Pentadecylic	36.2	4.00	3.76			(185)
C ₁₆ H ₃₁ CO ₂	Palmitic	34.7	4.08	3.65			(185)
C ₁₇ H ₃₃ CO ₂	Margaric	39.2	4.05	3.77			(185)
C ₁₈ H ₃₅ CO ₂	Oleic	36.2(?)					(185)
C ₁₈ H ₃₅ CO ₂	Isoleic	35.9					(185)
C ₁₈ H ₃₅ CO ₂	Elaidic	48.3	4.03	3.65			(185)

3. Aliphatic Acids. a. Monobasic.—(Continued)

Formula	Name	Maximum spacing, Å d_1	Broad line spacing Å				Lit.
			d_2	d_3	d_4	d_5	
$C_{18}H_{36}O_2$	Stearic	38.7	4 05	3 62			(184, 354)
$C_{22}H_{44}O_2$	Erucic	46 3	4 22	3 72			(185)
$C_{22}H_{42}O_2$	Brassicic	59 9	4 25	3 72			(185)
$C_{26}H_{52}O_2$	Behenic	47 8	4 10	3 66			(184)

b. Dibasic

$C_4H_6O_4$	Succinic	4 5					(354)
$C_6H_{10}O_4$	Adipic	7 0					(354)
$C_8H_{14}O_4$	Pimelic	7 6					(354)
$C_8H_{12}O_4$	Suberic	9 3					(354)
$C_9H_{16}O_4$	Azelaic	9 6					(354)
$C_{10}H_{18}O_4$	Sebacic	11 4					(354)

4. Salts

Formula	Name	Maximum spacing, Å	Broad line spacing Å				Lit.
			d_2	d_3	d_4	d_5	
$PbC_{17}H_{33}O_4$	Caproate	20 0					(355)
$PbC_{18}H_{35}O_4$	Caprylate	25 4					(355)
$PbC_{20}H_{39}O_4$	Caprate	30 6					(355)
$PbC_{22}H_{43}O_4$	Laurate	35.8					(355)
$PbC_{24}H_{47}O_4$	Myristate	41.2					(355)
$PbC_{26}H_{51}O_4$	Palmitate	46 3					(355)
$PbC_{28}H_{55}O_4$	Oleate	37.5; 29 8					(355)
$PbC_{28}H_{53}O_4$	Elaidate	50 0					(355)
$PbC_{18}H_{37}O_4$	Stearate	51 3					(355)
$NaC_{17}H_{33}O_2$	Laurate	33.5	4 22	4 88			(208)
$NaC_{19}H_{37}O_2$	Myristate	38 5	4 18	4 9			(208)
$NaC_{21}H_{41}O_2$	Palmitate	43 5	4 15	4 9			(208)
$NaC_{23}H_{45}O_2$	Oleate	43 5					(63)

Similar results obtained with K and NH_4 oleates

5. Esters

$C_{17}H_{34}O_2$	Methyl palmitate	22.0	4 07	3 72			(225)
$C_{19}H_{38}N_2O_4$	Ethyl <i>p</i> -azoxybenzoate	16 2	$d_1 = 19.9$ in the "smectic" state				(321)
$C_{18}H_{36}O_2$	Ethyl palmitate	23 2	4 07	3 67			(225)
$C_{19}H_{38}O_2$	Methyl stearate	24 0	4 07	3 74			(225)
$C_{20}H_{40}O_2$	Ethyl stearate	25 2	4 14	3 69			(225)
$C_{21}H_{42}O_2$	Octyl palmitate	30.4	4 16	3 72			(225)
$C_{23}H_{46}O_2$	Cetyl palmitate	40 4	4 05	3 69			(225)
$C_{24}H_{48}O_2$	Glycerol margarate	48 0					(355)

6. Ketones (319)

Formula	Name	Maximum spacing Å d_1
$C_{11}H_{22}O$	Di- <i>n</i> -hexyl	18 7
$C_{14}H_{28}O$	Methyl- <i>n</i> -tridecyl	42.4
$C_{17}H_{34}O$	Methyl <i>n</i> -pentadecyl	47.6
$C_{18}H_{36}O$	Methyl <i>n</i> -hexadecyl	50.0
$C_{19}H_{38}O$	Ethyl <i>n</i> -pentadecyl	25.2
$C_{19}H_{38}O$	Hexyl <i>n</i> -undecyl	25.2
$C_{19}H_{38}O$	Methyl <i>n</i> -heptadecyl	52.9
$C_{19}H_{38}O$	Propyl <i>n</i> -pentadecyl	26.3
$C_{20}H_{40}O$	Ethyl <i>n</i> -heptadecyl	27 3
$C_{21}H_{42}O$	Propyl <i>n</i> -heptadecyl	28.9
$C_{22}H_{44}O$	Hexyl <i>n</i> -pentadecyl	31.1
$C_{23}H_{46}O$	Di- <i>n</i> -undecyl	31.6
$C_{24}H_{48}O^*$	Hexyl <i>n</i> -heptadecyl	33.6
$C_{27}H_{54}O$	Di- <i>n</i> -tridecyl	37.0
$C_{31}H_{62}O$	Di- <i>n</i> -pentadecyl	41.1
$C_{33}H_{66}O$	Di- <i>n</i> -heptadecyl	47.2

* A few orders of 30.8Å also present.

7. Phenols (225)

$C_{22}H_{22}O$	<i>p</i> -Hexadecyl	46.5
$C_{24}H_{24}O$	<i>p</i> -Octadecyl	51.3

TABLE D.—ALLOYS

(a) Non-ferrous. Standard Arrangement. All Compositions in Atomic %

Pb-Sn.—0 to 3.6% Sn alloys are F.-c. cubic (like Pb) with a_0 decreasing to 4.931Å , taking a_0 for Pb as 4.942Å . 10% — 95% Sn alloys are mixtures of the Pb-like and Sn structures. 95% — 100% Sn alloys show no measurable distortion in size or shape of the Sn unit cell (206).

Hg-Sn.—The structure varies, as follows, with the atomic % of Hg: 0 to $\pm 2\%$, Tet.-Sn structure I; 2% I, with traces of "Hexagonal" amalgam, (composition unknown) structure II; 5% I and II; 6%, trace of I with II; 6 to $\pm 17\%$, II; ± 17 to 33%, II and liquid alloy (229).

Hg-Pb.—A 20% Hg alloy had the F.-c. cubic structure (4b) of Pb, with a unit cell length 1.6% less than that of Pb (229).

Hg-Zn.—Two structures, the hexagonal Zn structure (d), and an "hexagonal" structure belonging to an amalgam of unknown composition. The relative intensities of the patterns of these two phases are as follows (229):

Atomic % Hg		0	10	20	35
Zn structure	....	strong	medium	weak	absent
"Amalgam" structure		absent	medium	strong	strong

Hg-Cd.—An 18% Hg amalgam gave a pattern substantially the same as that of Cd; 37 and 50% Hg amalgams yield a different pattern (229).

Cu-Si.—Though Si has the smaller atomic volume the unit cube of Cu which has dissolved Si is larger than that of pure Cu. No data available (84).

Cu-Sn.—Figure 12a. Black circles: metal melted in air; open circles: metal melted in vacuum (18, 372).

Cu-Zn.—Figure 13. Unless otherwise stated on the figure these data are from (198). Cf. (12, 199, 258, 375, 371) which gives a different structure for γ -brass.

Ag-Sn.—Solution of Sn increases the Ag unit though its atomic volume is less. No data available (84).

Ag-Zn.—The observed phases are the same as those for Cu-Zn alloys (371).

Phase	Composition wt. % Zn	Symmetry	Structure	a_0 Å	c_0 Å	No. atoms in unit cell
β	38.25	Cubic	(1a, 1b)	3.156		2
γ	50.3	Cubic		9.327		52.37
ϵ	60.5	Hexagonal	Mg-like	2.818	4.456	2
η	78.1	Hexagonal	Mg-like	2.815	4.382	2

Hexagonal close-packed with Zn-like structure

Ag-Cu.—Broken series of solid solutions. Both components F.c. cubic (4b) (370).

At. % Cu	0	4	9.2	16.80	96.4	100
a_0	4.064	4.054	0.03	Superimposed patterns of Ag and Cu	3.61	3.61

Au-Zn.—These alloys show all the phases of Cu-Zn alloys and two additional (371).

Phase	Composition wt. % Zn	Symmetry	Structure	a_0 Å	c_0 Å	No. atoms in unit cell
β	30.2	Cubic	(1a, 1b)	3.146		2
γ	36.9	Cubic		9.268		52.97
	41.1	Cubic		9.223		51.96
ϵ	67.5	Hexagonal	Mg-like	2.809	4.377	2
	72.3	Hexagonal	Mg-like	2.809	4.369	2
η	95.0	Hexagonal	Zn-like	2.674	4.887	2
γ' (AuZn ₃)?	50.2	Cubic	?	7.880		32
γ''			may be cubic			

Au-Cu.—Figure 12 (18, 145, 361).

Au-Ag.—Data conflicting. Probably an unbroken series of solid solutions, though marked variations from this relation have been reported. Figure 16 (18, 165, 239, 372).

Ir-Os.—A single alloy of unknown composition was found to be C.p. Hex. (11).

Pd-H.—Data conflicting. One result (295, 376) shows that the Pd unit is swelled by an amount proportional to the quantity of occluded H (79). The other study (164) shows a discontinuous absorption of H in the sense that some crystals may be saturated though others in the same material have not begun to absorb gas. The length, a_0 , of the edge of the unit cube of the saturated solution was found to vary between 4.006 Å and 4.039 Å with values usually not less than 4.023 Å.

Pd-Cu and Pd-Au.—Figures 20 and 19 (301).

Pd-Ag.—(15) Figure 17 (165).

Mn-Cu.—67% Cu is F.c. cubic, like Cu, and has $a_0 = 3.615$ Å, taking a_0 for Cu as 3.60 Å (18). 70% Cu is said to give $a_0 = 3.70$ Å (200, 384).

Ni-Cu.—Figure 15 (18, 197, 361, 370).

Cr-Ni.—100% to 40% Ni alloys are F.c. cubic (like Ni) with values of a_0 which change proportionately to the % of Cr added from 3.521 Å (for Ni) to 3.576 Å (206).

W-Mo.—(67) Said to show an unbroken series of solid solutions. No numerical data available (18). No lines (86) have been found from a 1:1 alloy to indicate the existence of a compound W-Mo (239).

Al-Zn.—0 to 20% Zn alloys are F.c. cubic (like Al), a_0 changing from 4.043 Å (for Al) to 4.034 Å. 20%–95% Zn alloys show mixtures of cubic Al and hexagonal Zn structures. 95%–100% Zn alloys are C.p. hexagonal with no measurable distortion from size or shape of the Zn unit cell (208).

Al-Cu.—Figure 14. The data on this figure are from (22, 141, 197, 258).

Al-Ag.—The dissolving of Al in Ag increases the unit cube in the latter, though Al has a smaller atomic volume. No numerical data available (84).

Al-Mn-Cu.—Heussler Alloys. Alloy 15.9% Al, 23.9% Mn, 60.3% Cu is said to be F.c. cubic with $a_0 = 3.70$ Å. Alloys 14.3% Al, 28.6% Mn, 57.1% Cu is said to be a mixture of the preceding structure with a smaller amount of a B.c. cubic phase having $a_0 = 2.98$ Å (12, 297).

Mg-Sn.—0 to 67% Mg give the superimposed patterns of Sn and Mg₂Sn; 67–100% Mg yield the superimposed patterns of Mg₂Sn and Mg. No evidence of solid solution (370).

Mg-Pb.—0 to 67% Mg give the superimposed patterns of Pb and PbMg₂; 67–100% Mg yield the superimposed patterns of PbMg₂ and Mg. No evidence of solid solution (370).

Mg-Al.—91.2% Al is F.c. cubic (1b) with $a_0 = 4.106$ Å, taking a_0 for Al as 4.05 Å. 7.3% Al is C.p. hexagonal (d) with $a_0 = 3.151$ Å, $c = 5.23$ Å, taking a_0 for Mg as 3.17 Å and $c_0 = 5.17$ Å (197).

(b) Ferrous Alloys

Fe-C Steels.—(1) Austenitic Steels. Structure that of γ -Fe, F.c. cubic (4b) (250, 259).

Composition, wt. %	a_0 in Å	Remarks
(1) 1.25% C, quenched at 750°C	3.601	Contains also martensite.
(2) 1.98% C, quenched at 1100°C	3.629	Contains also martensite.
(3)* 1.34% C, 12.1% Mn, 0.52% Si, 0.1% P	3.624	A mixture of austenite and martensite.
(2) quenched at 750°C	3.606	
(4) 1.18% C, 24.3% Ni, 6.05% Mn quenched from 1000°C	3.64	
(5) 0.24% C, 25.2% Ni, quenched from 1000°C	3.56	

* Density calculations thought to indicate that C is present in interstitial solid solution in steel No. (3)

(2) Martensite Steels. Structure that of α -Fe, B.c. cubic (2a) (19, 122, 250, 258).

(5) Chilled subsequently in liquid air	2.81	Partly martensite and partly austenite.
(2)	2.90	Martensite lines very diffuse.
(1)	2.88	Martensite lines very diffuse.
(6) 0.80% C quenched in oil from 750°C	2.89	Martensite lines very diffuse.
(7) 0.80% C, 0.14% Cr, 0.35% Mn, 0.19% Si	2.851	Broad lines, less intense than from Fe.
(8) 1.31% C, 0.12% Cr, 0.24% Mn, 0.17% Si	2.851	Density calculations from this steel thought to indicate that C isomorphously replaces Fe unless martensite is annealed when it is a mixture of α -Fe with cementite.

Fe-Si.—(207, 252, 389).

Weight % Si	0-15	17-30	33	40	50	75-100
Phases	Fe	Fe + FeSi	FeSi	FeSi + FeSi ₂	FeSi ₂	FeSi ₂ + Si

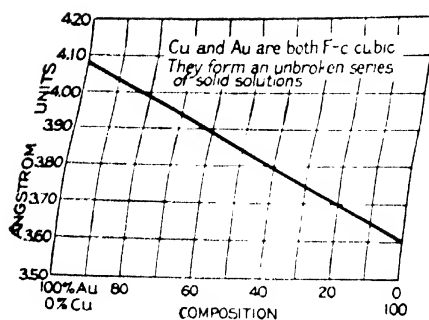


FIG. 12.—The diffraction data on Cu-Au alloys.

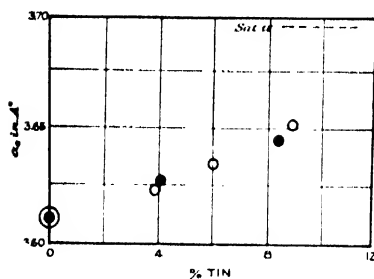


FIG. 12a.—The diffraction data on Cu-Sn alloys.

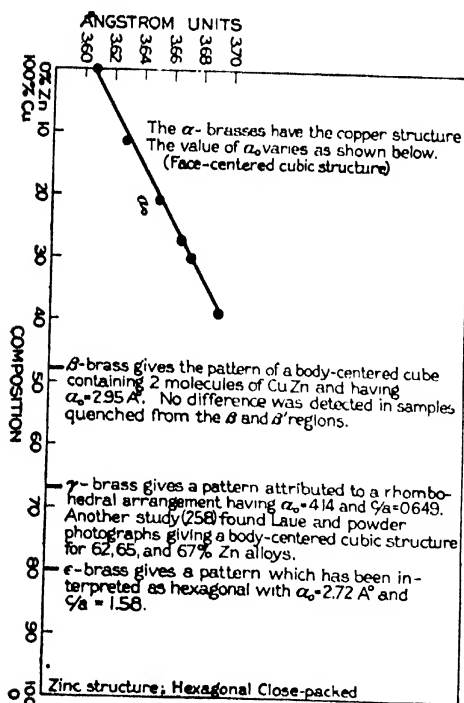


FIG. 13.—The diffraction data on brasses.

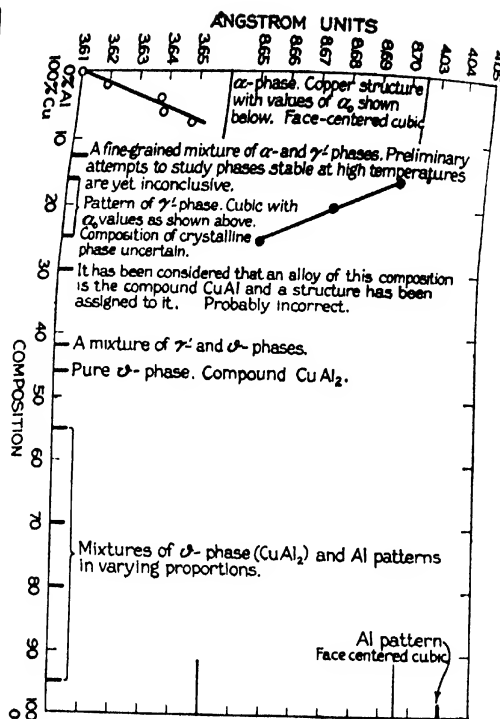


FIG. 14.—The diffraction data on Cu-Al alloys.

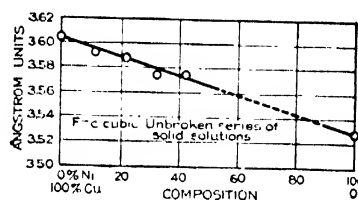


FIG. 15.—The diffraction data on Cu-Ni alloys.

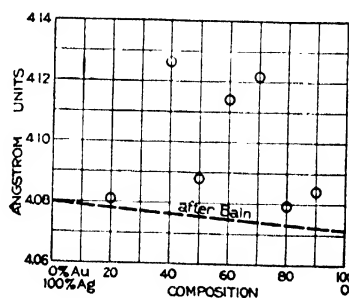


FIG. 16.—The diffraction data on Ag-Au alloys.

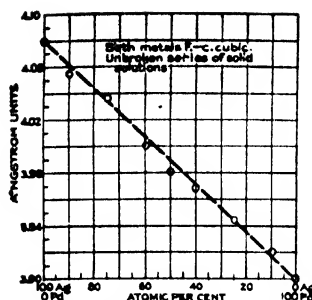


FIG. 17.—The diffraction data on Ag-Pd alloys.

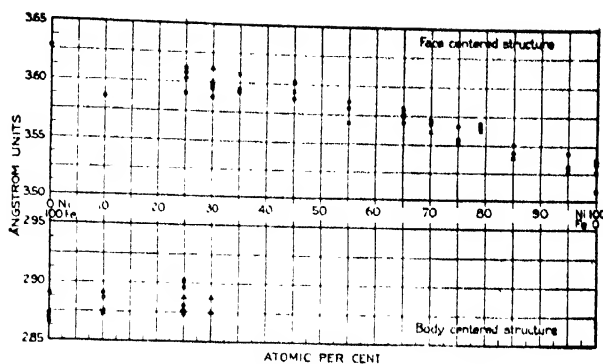


FIG. 18.—The diffraction data on Fe-Ni alloys.

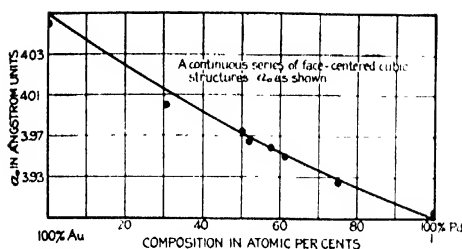


FIG. 19.—The diffraction data on Au-Pd alloys.

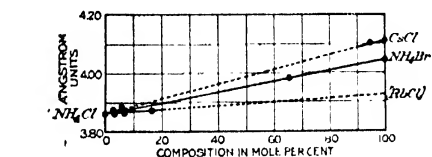


FIG. 21a.—The diffraction data on solid solutions of the alkali halides.

Fe-Mn.—These alloys are said to have the following structures. No numerical data available (18).

Atomic % Mn.	0-30	30-60	60-100
Structure.	B.-c. cubic (2a)	F.-c. cubic (4b)	Complex Mn

Fe-Co.—No numerical data available (12).

Weight % Co	0-80	85	90-98	98-100
Structure.	B.-c. cubic (2a)	B.-c. (2a) with F.-c. (4b)	F.-c. cubic (4b)	F.-c. (4b) with C.-p. hex

Fe-Ni.—The best available data are shown in Fig. 18. The fused alloys were swaged, drawn and rolled into thin tapes. Spacings from photographs of these specimens without further treatment are shown as open circles, results after (1) annealing at 900-950°C followed by slow cooling, black circles; (2) after an additional heating to 600°C followed by rapid cooling in the air, crosses; and (3) after cooling for a time in liquid air following (1), triangles (12, 168).

Fe-Cr.—Interpretation of data uncertain (18).

Fe-W and Fe-Mo.—It is said that Fe dissolves a few atomic percents of each of these metals without apparent alteration in the size of the unit cell. In each case a 1:1 compound is formed. No numerical data available (18).

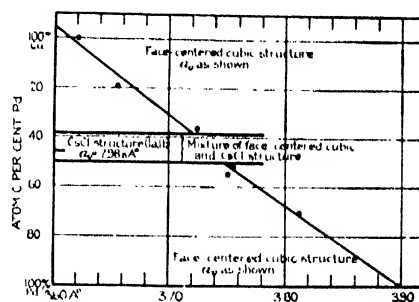


FIG. 20.—The diffraction data on Cu-Pd alloys.

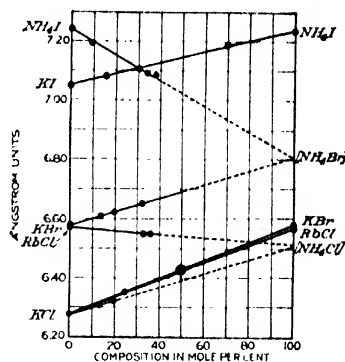


FIG. 21b.—The diffraction data on solid solutions of the alkali halides.

TABLE.—THE POSITIONS OF X-RAY DIFFRACTION BANDS FROM LIQUIDS

Angle of Deviation and Wave Length, λ , of X-rays Used				
Liquid	A	N ₂	O ₂	
Angle, deg	13.0; 18.9	27	11.3; 17.0	12.5; 19.5
λ , in Å	0.712	1.54	0.712	0.712
Lit.	(304)	(303)	(304)	(303)
Liquid	H ₂ O	CS ₂	HCOOH	CH ₃ CHO
Angle, deg	13.4	20	13.2	24
λ , in Å	0.712	1.54	0.712	1.54
Lit.	(304)	(303)	(304)	(303)

LITERATURE

(For a key to the periodicals see end of volume)

Liquid	C_2H_5OH	$C_4H_8O_2$ Butyric acid	$C_4H_8O_2$ Ethyl acetate	$(C_2H_5)_2O$
Angle, deg	22	20 7; 30 5	20 7	19
λ , in Å	1.54	1.54	1.54	1.54
Lit	(303)	(373)	(373)	(303)

Liquid	C_6H_6	$(C_2H_5O)_2$ Paraldehyde	C_6H_5CHO Benzaldehyde
Angle, deg	8 5	18	23 3
λ , in Å	0 712	1 54	1 54
Lit	(301)	(302, 303)	(373)

Liquid	C_6H_6	C_6H_6 Mesitylene	$C_{14}H_{12}O_2$ Benzyl benzoate
Angle, deg	8 1	4 1; 6 2	18 3; 42 7; 65 8
λ , in Å	0 712	0 712	1 54
Lit	(301)	(301)	(373)

TABLE.—DATA ON SOLID SOLUTIONS OF SALTS

Alkali Halides.—For data on the solutions NH_4I-NH_4Br , NH_4I-KI , $NH_4Br-KBr$, $RbCl-NH_4Cl$, $NH_4Cl-KCl$, $KCl-RbCl$, $KCl-KBr$, $CaCl-NH_4Cl$, NH_4Br-NH_4Cl , $RbCl-NH_4Cl$ see Fig. 21 (120). For additional data on $KBr-KCl$ see (387, 388).

AgCl-NaCl (387).—Broken series of solid solutions. Quenched preparations: Both patterns present together.

	Composition mol % AgCl	a_0 Å
Annealed	100	5.53
	75	5.51
	50	5.57

AgCl-AgBr (402).—Both structures like NaCl (4b, 4c). Unbroken series of solid solutions

Composition mol % AgCl	a_0 Å
0	5.77
20	5.72
40	5.68
50	5.65
60	5.63
80	5.59
100	5.51

AgBr-AgI (402).—Broken series of solid solutions

Com- position mol % AgI	a_0				Precipi- tated
	Fused and slowly cooled	Fused and quenched			
	Structure (4b, 4c)	Structure (4b, 4d)	Structure (4b, 4c)	Structure (4b, 4d)	Structure (4b, 4c)
0	5.768		5.768		5.768
10	5.814		5.816		5.806
20	5.842		5.851		5.84
30	5.86		5.876		5.878
40	5.896	(6 47)	5.908		
50	5.912	(6 47)	5.932		
60	5.918	6 47	5.96	(6 48)	
70	5.944 5.994	6 48	5.956	6 48	
80	5.916	6.47	(5.892)	(6 48)	
90		6.472	5.898	6 483	
95		6.481		6 487	
100		6.493		6 493	

- (1) Allison, 12, 8: 261; 24. (2) Alsen and Aminoff, 207, 44: 124; 22. (3) Aminoff, 207, 41: 407; 19. (4) Aminoff, 24, 56: 495; 21. (5) Aminoff, 24, 56: 506; 21. (6) Aminoff, 24, 57: 180; 22. (7) Aminoff, 24, 57: 204; 22. (8) Aminoff, 207, 44: 444; 22. (9) Aminoff, 24, 58: 203; 23. (10) Aminoff, 24, 60: 262; 24. (11) Aminoff, 24, 56: 510; 21. (12) Andrews, 2, 18: 245; 21. (13) van Arkel, 208, 4: 286; 24. (14) Asahara, 210, 1: 23. 22. 209, 1: 35; 22. (15) Astbury, 58, 113: 53; 23. (16) Astbury, 5, 102A: 506; 23. (17) Astbury, 5, 104A: 219; 23. (18) Bain, 33, 28: 21. 576, 23. (19) Bain, 80, preprint; Feb. 24. (20) Bartlett and Langmuir, 1, 48: 84; 21. (21) Beckenkamp, 55, 110: 290; 20. (22) Becker, 95, 15: 303; 23. (23) Becker, 96, 24: 65; 24. (24) Becker and Ebert, 96, 16: 105; 23. (25) Becker and Jancke, 7, 99: 242; 21. (26) Becker and Rose, 96, 17: 351; 23. (27) Becker and Rose, 96, 14: 360; 23. (28) Berndt, 211, 38: 1.21. (29) Bjl and Kolkmeijer, 176, 16: 1294, 18. 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(88) Debye and Scherrer, 65, 17: 277; 16. (89) Debye and Scherrer, 63, 18: 201, 17. (90) Denison, 2, 17: 20, 21. 135, 123: 54; 21. (91) Dickinson, 1, 43: 85; 20. (92) Dickinson, 1, 44: 276; 22. (93) Dickinson, 1, 44: 774; 22. (94) Dickinson, 1, 44: 1480; 22. (95) Dickinson, 1, 44: 2404, 22. (96) Dickinson, 1, 45: 958; 23. (97) Dickinson and Friauf, 1, 46: 2457; 24. (98) Dickinson and Goodhue, 1, 43: 2045; 21. (99) Dickinson and Pauling, 1, 45: 1466, 23. (100) Dickinson and Raymond, 1, 45: 22, 23. (101) Eastman, 1, 46: 917; 21. (102) Espig, 211, 38: 53; 21. (103) Ewald, 2, 44: 257; 14. (104) Ewald, 65, 15: 399, 14. (105) Ewald, 213, 1914: 325. (106) Ewald and Friedrich, 8, 44: 1183, 14. (107) Gerlach, 65, 22: 557; 21. (108) Gerlach, 65, 23: 114, 22. (109) Gerlach, 96, 9: 184, 22. (110) Gerlach and Pauli, 96, 7: 116, 21. (111) Goldschmidt and Thomassen, 214, No. 2: 5, 23. (112) Gonell and Mark, 7, 107: 181, 23. (113) Greenwood, 3, 48: 654, 24. (114) Gross, 189, 1919: 201. 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SOME NUMERICAL DATA PERTAINING TO DISPERSOIDOLOGY

P. P. VON WEIMARN

From the large and heterogeneous mass of numerical data recorded in the literature of "Colloids," it seems desirable to present here only some selected illustrative examples of results of physical measurements which meet the following requirements: (1) The composition of the system is definite, reproducible, and exactly known; (2) all of the essential variables which affect the system are understood and are accurately controlled or measured; (3) the system, its behavior, and the resulting quantitative data are reproducible in the hands of any investigator working under these same controllable conditions; and (4) the examples selected shall be illustrative of some general law describing the behavior of dispersed systems.

As meeting the above conditions, the following examples have been selected and are presented in graphical form. Concise explanations are given in connection with the graphs. For a detailed description, explanation, discussion, and bibliography, the reader is referred to von Weimarn, *Chem. Rev.* 2: 217; 25.

THE PRECIPITATION LAWS

Figures 1-9 illustrate the following precipitation laws: With increasing concentration of the reacting solutions, the average size of the precipitated crystalline individuals (*not their aggregates*) (1) passes through a maximum during, and (2) decreases continually after the completion of, the process of direct crystallization; (3) for the same absolute concentration of the reacting solutions (*other conditions being equal*), with decreasing solubility of a substance (Fig. 4; cf. Fig. 13), the average size of the precipitated crystals also decreases.

Figures 10-13 show that, if the aggregation of the individual ultramicrocrystals has not proceeded too far, the second law of precipitation remains valid; and besides they illustrate the law: (4) With increasing viscosity of the dispersion medium, the average size of the particles decreases (Fig. 12) (3, 4); cf. (1).

The following general remarks apply to the figures: (1) The dispersion medium is indicated thus (60 vol. % C_2H_5OH); (2) mixing was brought about in all cases by pouring and shaking. The direction of pouring is indicated by the arrow. (3) In Figs. 1-9, the volumes mixed in each experiment satisfied the relation, concentration \times volume = a constant (approx.), for a given dispersion medium; (4) the time, t_0 , represents the period (ca. 10-15 min) required for the operations of sampling and photomicrographing; (5) all data shown are the averages of at least two independent experiments.

1. Precipitation of Ag_2SO_4 .—Reaction.— $2AgNO_3 + MnSO_4 = Ag_2SO_4 + Mn(NO_3)_2$ (Figs. 1-7). In Figs. 4-5, per liter of final

solution, $C = Ag_2SO_4$ produced by the reaction and $S =$ its solubility, both in g-equivalents (8).

2. Precipitation of $AgC_2H_3O_2$.—Reaction.— $AgNO_3 + KC_2H_3O_2 = AgC_2H_3O_2 + KNO_3$ (Figs. 8-9) (6). These curves show the effect of time; the periods of time for the four curves are the same in both figures.

3. Precipitation of Se. —Reaction.—(a) 5 cc of aniline (an.) containing m mg of Se are poured into 100 cc of 93.5 wt. % C_2H_5OH (alc.) or (Fig. 13) mixtures thereof with an. or (Fig. 12) glycerol (gl.). $t = 20^\circ$ (Figs. 10-13 a curves) (7). (b) As in (a) but with quinoline (q.) instead of aniline and using 90 wt. % C_2H_5OH (Figs. 10-13 b curves) (7).

4. Effects of Salts Dissolved in the Dispersion Medium on the Duration of Life of Dispersoidal Solutions.—(a) $BaSO_4$ Reaction.—50 cc ($2a + 2x$ equiv.) $BaR_2 + 50$ cc ($2a$ equiv.) $MnSO_4 = 1$ equiv. $BaSO_4 + 1$ equiv. $MnR_2 + x$ equiv. BaR_2 Dispersion medium, 63 wt. % C_2H_5OH (Figs. 14-17) (5).

(b) S .—Dispersoidal solution of sulfur prepared by the method of grinding with grape-sugar. Ca. 25 mg S per liter of H_2O , particles ca. 85μ (Figs. 18-23). $C =$ millimols salt per liter. The dotted horizontal is for $C = 0$. To the right of the dotted vertical (Fig. 23) the disperse phase begins to dissolve by chemical action (10); cf. (2).

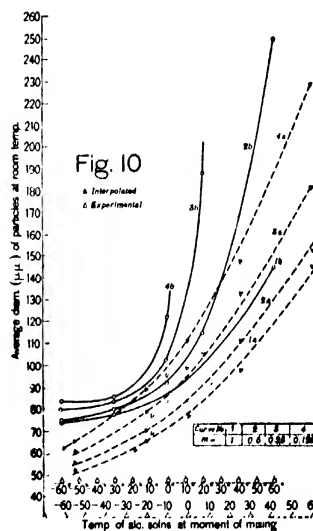
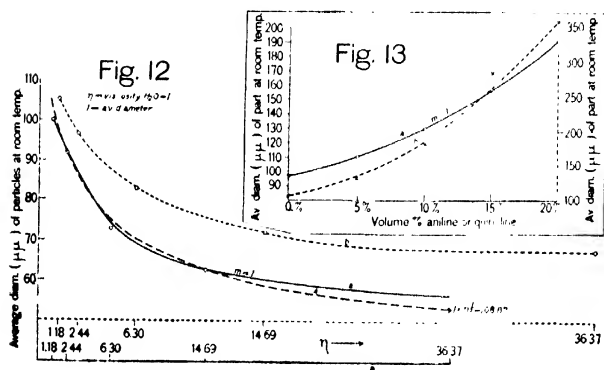
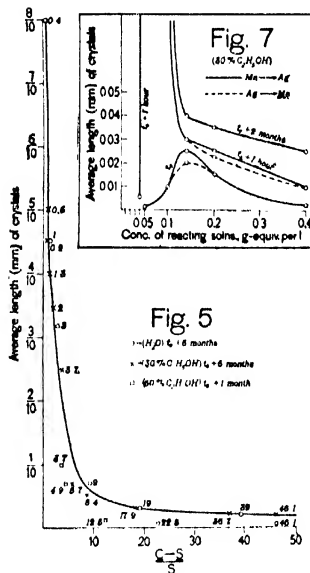
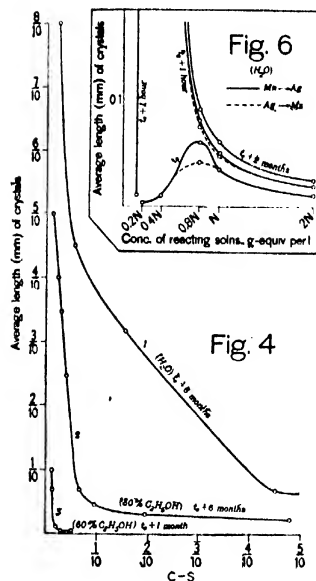
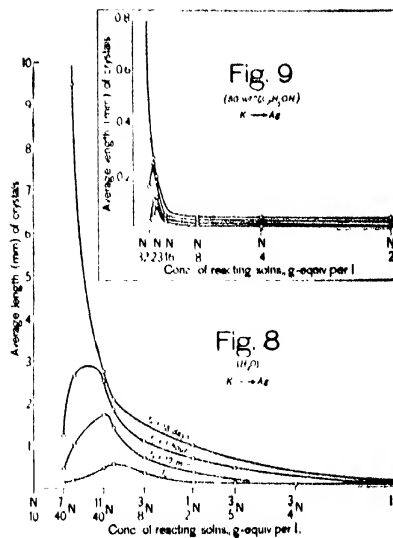
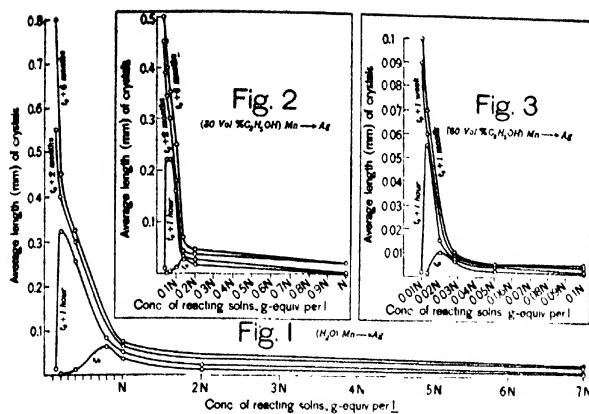
(c) $Al(OH)_3$.—Prepared as in (b) *supra*. Ca. 55 mg $Al_2O_3 \cdot 3H_2O$ per liter of H_2O ; particles ca. 90μ (Fig. 24). The dotted horizontal is for $C = 0$. Dissolving begins at points marked with crosses (11); cf. (2).

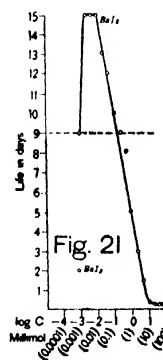
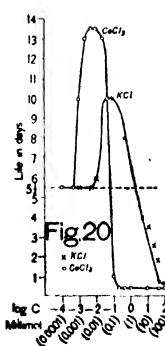
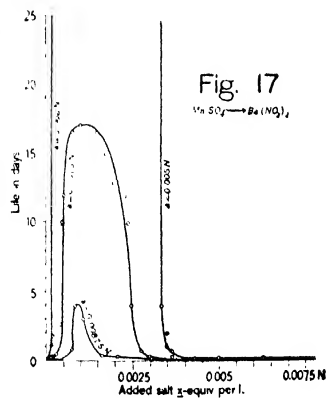
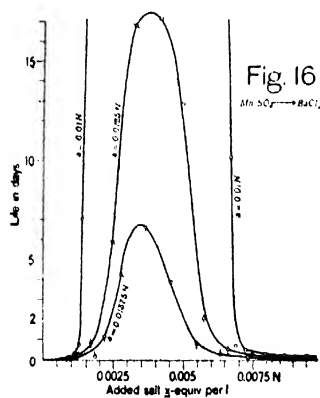
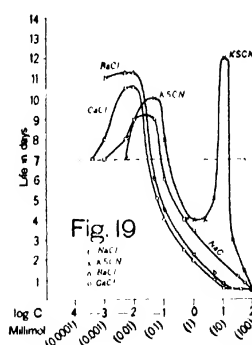
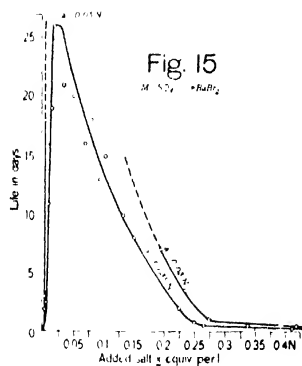
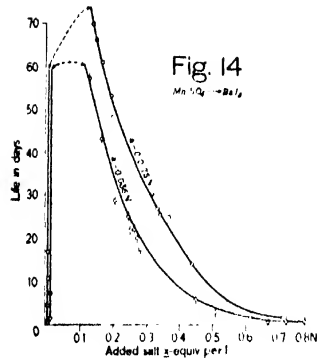
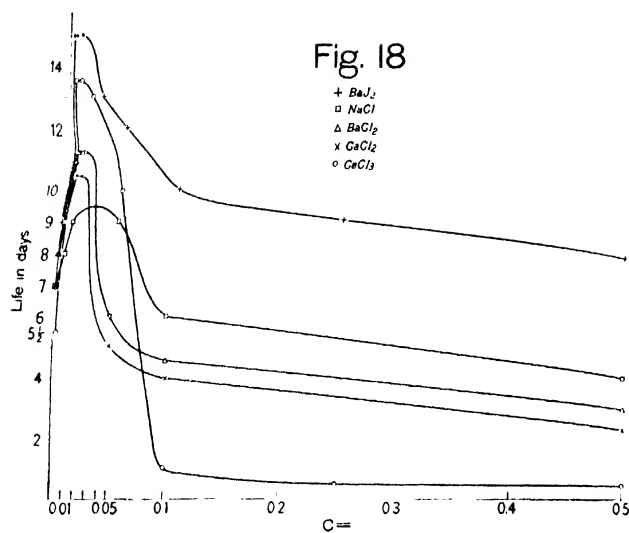
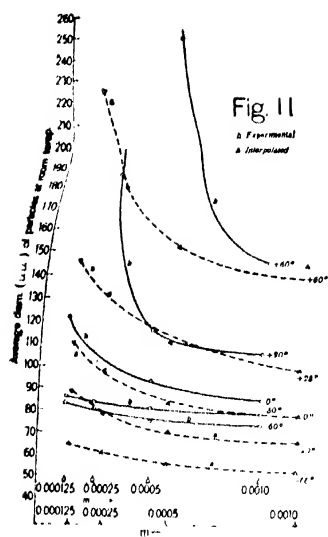
5. Adsorption and Solubility of Salts.—Adsorbent used— $BaNO_3$ extra pure; 20 g used per 100 cc of the salt solution. After shaking the solution with the adsorbent for 10 min, 24 hr. were allowed for the precipitate to settle. Fifty cc of the upper clear layer were used for analysis. Because partial dispergation occurred in the case of $BaCl_2$ in dilute C_2H_5OH solutions, these were centrifuged before analysis (Fig. 25) (9).

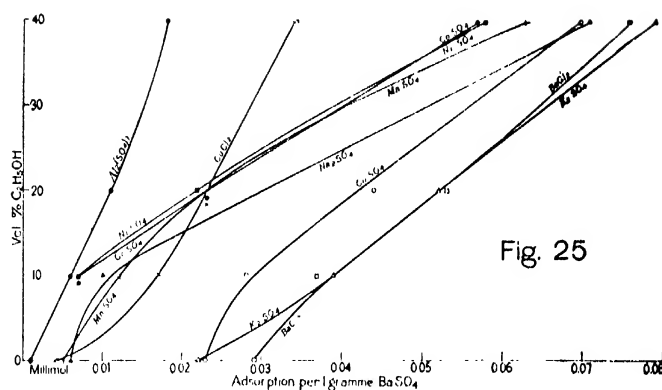
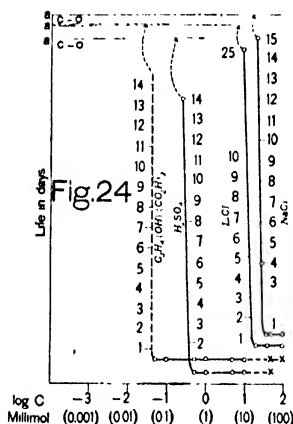
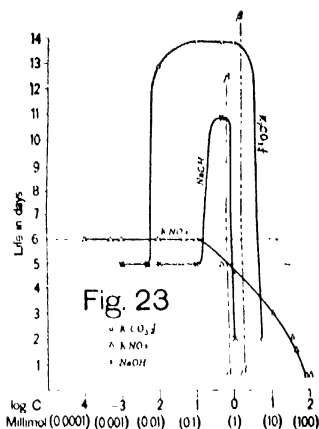
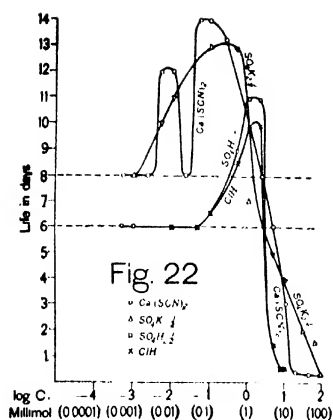
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(For a key to the periodicals see end of volume)

- (1) Odén, 55, 26: 120; 20. (2) Ostwald, 55, 26: 28, 69; 20. (3) von Weimarn, 55, 26: 267, 624; 06. (4) von Weimarn, 55, 26: 933, 1400; 06. 55, 2: 76; 07. 227, 18: 44; 23. (5) von Weimarn, Aoki and Kataoka, O. In part in von Weimarn, 228, 2: 199; 24. (6) von Weimarn and Hori, O. (7) von Weimarn and Morishima, O. In part in von Weimarn 55, 26: 10; 25. (8) von Weimarn and Otsuka, O. In part in von Weimarn, 55, 26: 234; 23. (9) von Weimarn, Schochara and Takashige, O. In part in von Weimarn, 55, 26: 242, 23. (10) von Weimarn and Utsino, 55, 26: 265; 25. (11) von Weimarn and Utsino, O.







SWEETENING AGENTS. RELATIVE SWEETENING POWER

C. F. WALTON, JR.

The relative sweetness of various substances is usually cited in comparison with sucrose as unity. Since the concentration of the standard sucrose solution employed by different investigators has varied from 1 to 10%, and since the degree of sweetness does not decrease proportionately with dilution, the values reported in the literature vary accordingly, and are difficult to arrange accurately in numerical order. The following table, therefore, indicates only the approximate degree of sweetness, as reported by different investigators employing a variable procedure.

RELATIVE DEGREE OF SWEETNESS
(Sucrose = 1.0)

Name	Formula	Degree of sweetness	Lit.
Lactose	$\text{C}_{12}\text{H}_{22}\text{O}_{11}$	0.27-0.28	(26)
Dulcitol	$\text{C}_6\text{H}_{14}\text{O}_6$	0.41	(26)
Mannitol	$\text{C}_6\text{H}_{14}\text{O}_6$	0.45	(26)
Sorbitol	$\text{C}_6\text{H}_{14}\text{O}_6$	0.48	(26)
Glycerol	$\text{C}_3\text{H}_8\text{O}_3$	0.48	(26)
Glycol	$\text{C}_2\text{H}_6\text{O}_2$	0.49	(26)
Dextrose (d-glucose)	$\text{C}_6\text{H}_{12}\text{O}_6$	0.50-0.60	(10, 26, 29)
Maltose	$\text{C}_{12}\text{H}_{22}\text{O}_{11}$	0.60	(26, 29)

RELATIVE DEGREE OF SWEETNESS.—(Continued)

Name	Formula	Degree of sweetness	Lit.
Invert sugar (dextrose + levulose)	$C_6H_{12}O_6 + C_6H_{12}O_6$	0.78–0.95	(10, 26, 29)
Sucrose.....	$C_{12}H_{22}O_{11}$	1.00	(10, 26, 29)
Levulose (d-fructose)	$C_6H_{12}O_6$	1.03–1.50	(10, 26, 29)
p-Anisylurea.....	$CH_3OC_6H_4NHCONH_2$	18	(8)
Chloroform.....	$CHCl_3$	40	(31)
Glucin.....	Mixture	100	(11)
p-Methylsaccharin	$CH_3C_6H_4COSO_2NH_2$	200	(19)
Dulcin (p-phenetylurea)	$C_6H_5OC_6H_4NHCONH_2$	70–350	(11, 26)
6-Chlorosaccharin...	$ClC_6H_4COSO_2NH_2$	100–350	(19)
n-Hexylchloromalonamid	$n-C_6H_{13}CCl(COCONH_2)_2$	300	(11)
Saccharin (o-benzosulfonimid)	$C_6H_4COSO_2NH_2$	200–700	(11, 26)
Perillaldehyde α-anti-aldoxime (peryllartine)	$C_8H_8C(CH_3)CH_2CHNOH$	2000	(16)

LITERATURE

(For a key to the periodicals see end of volume)

The following list contains certain general references on methods of testing relative sweetening power, etc.

- (1) Auerbach, *218*, 10: 710; 22. (2) Barral and Ranc, *271*, 56: 712; 18. (3) Barral and Ranc, *283*, 17: 10; 20. (4) Becker and Hersog, *203*, 32: 496, 07. (5) Boedecker and Rosenbueh, *273*, 30: 251; 20. (6) Braun and Rawies, *25*, 49: 799; 16. (7) Cohn, *Die Organischen Geschmacksstoffe* (Siemanroth, Berlin, 1914). (8) Cohn, *196*, 23: 1; 16. (9) Cohn, *274*, 56: 735, 703; 14. (10) Deerr, *275*, 24: 481; 22. (11) Dox and Houston, *1*, 48: 1278; 24. (12) Dyson, *276*, 11: 572; 24. (13) Foerster, *288*, 28: 400; 11. (14) Fränkel, *Arzneimittelsynthese* (Springer, Berlin, 1921): 134–53. (15) Furukawa, Japanese Patent 35332; 19. (16) Furukawa, *41*, 41: 706, 979; 20. (17) Hermann, *15*, 459: 163; 22. (18) Holleman, *70*, 40: 446; 21. (19) Holleman, *70*, 45: 839; 23. (20) Holleman and Choufoer, *24V*, 23: 307; 24. (21) Kionka and Sträts, *277*, 98: 241; 22. (22) Kodama, *41*, 41: 495; 20. (23) Laasarev, *278*, 194: 293; 22. (24) Oertley and Myers, *1*, 41: 855; 19. (25) Ogilvie, *275*, 24: 248, 22. (26) Paul, *279*, 43: 137; 22. (27) Paul, *280*, 26: 610; 22. (28) Paul, *286*, 125: 97; 21. (29) Sale and Skinner, *45*, 14: 522; 22. (30) Speckam, *273*, 22: 83; 22. (31) Sternberg, *281*, 28: 272; 05. (32) Zuntz, *98*, 23: 385; 10.

ODORIFEROUS MATERIALS

II. ZWAARDEMAKER

The unit used for expressing odor is the *olfacty*, the normal stimulus threshold for a given odor.

The characteristic grouping giving rise to odor is termed odoriphore (*), also called aromatophore (Klimout, 1897) and osmophore (Rupe, 1900). The principal odoriphores are: $\leftarrow C(O) \leftarrow$ Alkyl, esters; $\leftarrow C(O)H$, aldehydes; $\leftarrow CO$, ketones; Alkyl O-Alkyl, ethers; $\leftarrow C=OH$, alcohols; $\leftarrow C(O)OH$, acids; $\leftarrow NO_2$, nitrites; $\leftarrow CN$, nitriles; $\leftarrow \text{terpenes}$; $\leftarrow \text{pinenes}$; $\leftarrow S-S \rightarrow$, sulfides; $\leftarrow As-As \rightarrow$ arsenides; $\leftarrow As-O-As \rightarrow$ cacodyls; $\leftarrow Hal.$, halogens; $\leftarrow N$, pyridine; $\leftarrow NH$, pyrrole.

CLASSIFICATION

LINNÉ, MODIFIED BY ZWAARDEMAKER

Type	Key letter
Odores aetherei Lorry (Etheral)	A
Odores aromatici Linné (Aromatic):	
1. Almond.....	B
2. Camphoric.....	C
3. Citric.....	D
Odores fragantes Linné (Balsam):	
1. Floral.....	E
2. Lilylike.....	F
3. Vanillin.....	G
Odores ambrosiae Linné (Musk)...	H
Allyl.....	I
Cacodylic.....	J
Odores empyreumatic Haller (Empyreumatic)...	K
Odores hireini Linné (Caprylic).....	L
Odores tetri Linné (Narcotic).....	M
Odores nauseosis Linné (Nauseous)...	N

Intensity.—The intensity of the odor of an odorivector (5) depends on (1) its volatility from dilute solution, (2) its rate of diffusion, (3) its absorption by a humid surface and (4) its solubility in liquids. (All odorous substances are soluble in oil (2).) The significance of an odor as a reflex stimulus depends on physiological, its pleasing or repulsive value on psychological conditions.

VOLATILITY OF ODOR FROM PARAFFINIC SOLUTIONS (4)

Substance	Concn. per cent	Volatility 10 ⁻⁶ g per min
Ethyl sulfide (I).....	1	0.14
Scatole (N).....	1	0.18
Valeric acid (L).....	0.1	0.28
Guaiacol (K).....	1	0.5
Pyridine (M).....	10	0.93
Isoamyl acetate (A).....	5	3.6
Terpineol (C).....	25	7.5
Nitrobenzene (B).....	50	9.2

DIFFUSION IN FREE AIR IN NEIGHBORHOOD OF SOURCE (10)

	cc per sec		cc per sec
Eugenol (C).....	1.3	Ethyl ether (A).....	4.4
Camphor (C).....	2.1	Ethylacetone (A).....	10

Extremes—ethyl acetate (A) and naphthalene (K). The anemodispersibility of odors depends on the size of the cloud and the velocity of the wind.

Spray Electricity.—All odorous substances lower the surface tension of water and therefore produce static electricity by spraying an aqueous solution of the odorivector against a disc well insulated with amber and paraffin. The value is expressed as 10^{-10} coulomb per cc of a saturated solution.

Substance	10^{-10} coulombs	Lit.
Cumidine (K)	0.2	(12)
Aniline (K)	0.4	(6)
Toluidine (K)	0.4	(6)
Nylidine (K)	0.9	(6)
Scatole (N)	1.0	(12)
Trinitroisobutyltoluene (H)	1	(12)
Pseudocumene (K)	3.4	(2)
Ethyl acetate (A)	3.5	(2)
Xylene (K)	3.8	(6)
Aniline (K)	4.8	(2)
Toluene (K)	5.1	(2)
Thymol (C)	6.5	(2)
Benzene (K)	7.5	(2)
Toluidine (K)	7.9	(2)
Nylidine (K)	9.3	(2)
Nitrobenzene (B)	9.6	(2)
Vanillin (G)	10	(2)
Dimethylaniline (K)	11.6	(6)
Benzaldehyde (B)	12.4	(2)
Anisaldehyde (G)	14.8	(2)
Phenol (K)	15.2	(2)

Substance	10^{-10} coulombs	Lit.
Xylenol (K)	17	(2)
Ethyl alcohol (A)	17.2	(2)
Cresol (K)	19.1	(12)
Camphor (C)	20.3	(12)
Heliotropin (F)	44	(2)
Vanillin (G)	47	(12)
Heliotropin (F)	52	(12)
Acetone (A)	60	(12)
Guaiacol (K)	81.1	(2)
Carvacrol (C)	82.3	(2)
Terpineol (E)	89.1	(2)
Amyl acetate (A)	96.4	(2)
Ethyl acetate (A)	122	(12)
Guaiacol (K)	280	(12)
Terpineol (E)	296	(12)
Citral (D)	360	(12)
Methyl anthranilate (E)	602	(12)

RELATION BETWEEN SPRAY ELECTRICITY AND CONCENTRATION OF AQUEOUS SOLUTIONS (12)

		CHARGE IN 10^{-10} COULOMBS PER CC						
Degree of saturation		1	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$
Coumarin		6.5	2	0.5	0			
Heliotropin		52	22	10	2	1.4	1.4	0
Vanillin		72	32	6	2	0.5	0	

ABSORPTION OF ODORS BY SURFACES EXPRESSED AS THE DURATION OF THE AFTER EFFECT FOLLOWING AN EXPOSURE TO A CONTINUOUS STREAM OF ODORIFEROUS AIR FOR 5 MINUTES (11). THE TERM sec DENOTES A FEW SECONDS, m = MINUTE, d = DAY, h = HOUR, min = SOME MINUTES

	Aluminum	Copper	Glass	Gold	Iron	Lead	Nickel	Porcelain	Silver	Steel	Tin	Zinc
Ethyl disulfide	1 m	sec	sec	sec	sec	1 m	sec	2 m	sec	sec	sec	sec
Guaiacol	15 m	3 m	1 m	12 m	8 m	sec	5 m	5 m	0	7 m	8 m	25 m
Ionone	2.5 d	2 d	sec		4 d	1 d	2 d	sec	sec	4 d	min	
Isoamyl acetate	0	0	0	0	sec	0	sec	15 m	0	2 m	0	sec
Muscon	1 d	4 d	1 d	2 d	min	12 d	4.9 d	sec	2 d	sec	4 d	3 d
Nitrobenzene	sec	sec	sec	sec	sec	sec	sec	8 m	sec	sec	sec	sec
Pyridine	0	2 m	0	0	45 m	sec	sec	5 m	0	30 m	0.5 m	2.5 m
Scatole	9 d	3 d	1.5 h	1.5 d	10 d	10 d	3.5 d	0	1 d	20 d	7 d	14 d
Terpineol	0	sec	0	0	sec	0	0	5 m	sec	4 m	0	0
Valeric acid	3 m	0	30 m	sec	0	0	sec	0	5 m	0	2 m	0

Destruction of Odors by Ultraviolet Light.—The values are expressed as number of minutes required to reduce the odor in air from 2 to 1 olfact by the radiation from a quartz mercury lamp (7).

Substance	Time	Substance	Time
Apiol (C)	0.10	Methyl salicylate (C)	0.30
Valeric acid (L)	0.10	Trimethylamine (J)	0.30
Menthol (C)	0.15	Methyl nonyl ketone (C)	0.35
Ethyl sulfide (I)	0.25	Thymol (C)	0.40
Carvacrol (C)	0.25	Borneol (C)	0.45
Bornyl acetate (C)	0.30	Isoamyl acetate (A)	0.45
Caproic acid (L)	0.30	Pyridine (M)	0.45

Substance	Time	Substance	Time
Safrol (C)	0.50	Methylheptenone (A)	2.30
Salicylaldehyde (C)	0.50	Eugenol (C)	3
Scatole (N)	0.50	Styrone (F)	3
Citral (D)	0.55	Coumarin (G)	3.30
Indole (N)	1.0	Ethyl isovalerate (A)	4
Aniline (K)	1.40	Cresol (K)	5
Methyl anthranilate (E)	1.45	Ethyl butyrate (A)	5
Methyl butyrate (A)	2.0	Terpineol (E)	5
Vanillin (G)	2.0	Chloroform (A)	6
Citronellol (E)	2.30	Ethyl succinate	6
Eucalyptol (C)	2.30	Anethol (C)	6.30
Isobutyl alcohol (K)	2.30	Linalyl acetate (D)	7

ODORIMETRY

The olfact of an odor is the threshold or minimum perceptible concentration expressed in gms per cc which multiplied by $6.06 \times 10^{21}/M$, where M is the molecular weight, gives molecules per cc.

The authorities quoted are: Backman (1); Berthelot (2); Fischer and Peuzoldt (3); Henning (4); Hermanides (5); Huyer (6); Ohina (7); Passy (8); Tempelaar (9); van Wartenberg (10); Zwaardemaker (11).

Compound		Molecules per cc = $A \cdot 10^x$		Author-ity
Name	Formula	A	x	
Ionone (F)	$C_{15}H_{24}O$	16	5	4
Ethyl bisulfide (I)	$C_4H_{10}S$	32	5	9
Scatole (N)	C_9H_8N	15	6	9
Vanillin (G)	$C_8H_8O_3$	16	6	5
Trinitroisobutyltoluene (H)	$C_{11}H_{13}N_3O_6$	18	6	9
Coumarin (G)	$C_9H_6O_2$	20	6	8
Citral (D)	$C_{10}H_{16}O$	21	6	9
Valeric acid (L)	$C_5H_{10}O_2$	33	6	9
Butyric acid (L)	$C_4H_8O_2$	40	6	8
Isoamyl alcohol (K)	$C_5H_{12}O$	47	6	4
Vanillin (G)	$C_8H_8O_3$	69	6	8
Valeric acid (D)	$C_5H_{10}O_2$	69	6	8
Heptylic acid (C)	$C_7H_{14}O_2$	72	6	9
Guaiacol (K)	$C_7H_8O_2$	12	7	9
Citral (D)	$C_{10}H_{16}O$	16	7	8
Methyl anthranilate (E)	$C_9H_9NO_2$	18	7	5
Nitrobenzene (B)	$C_6H_5NO_2$	20	7	9
Heliotropine (F)	$C_{11}H_{15}O_4$	24	7	9
Coumarin (G)	$C_9H_6O_2$	32	7	4
Iodoform	CHI_3	40	7	4
Bromoform	$CHBr_3$	41	7	8
Osmium tetroxide	OsO_4	42	7	2
Oenanthal alcohol (C)	$C_7H_{14}O$	48	7	8
Valeric acid (D)	$C_5H_{10}O_2$	48	7	10
Cinnamaldehyde (C)	C_9H_8O	52	7	8
Nonylic acid (E)	$C_9H_{18}O_2$	59	7	8
Isobutyl alcohol	$C_4H_{10}O$	64	7	9
Thymol (C)	$C_{10}H_{14}O$	77	7	8
Capric acid (L)	$C_{10}H_{20}O_2$	82	7	8
Heliotropine (F)	$C_{11}H_{15}O_4$	15	8	9
Nitrobenzene (B)	$C_6H_5NO_2$	18	8	8
Borneol (C)	$C_{10}H_{18}O$	20	8	5
Coumarin (G)	$C_9H_6O_2$	20	8	9
Eucalyptol (C)	$C_{10}H_{18}O$	21	8	9
Citral (D)	$C_{10}H_{16}O$	22	8	9
Linalyl acetate (D)	$C_{13}H_{20}O_2$	25	8	9
Lauric acid (C)	$C_{12}H_{24}O_2$	29	8	9
Pyridine (M)	C_5H_5N	30	8	8
Pulegon (M)	$C_{10}H_{16}O$	31	8	9
Eucalyptol (C)	$C_{10}H_{18}O$	33	8	9
Heliotropine (F)	$C_{11}H_{15}O_4$	39	8	7
Carvacrol (C)	$C_{10}H_{14}O$	40	8	8
Propionic acid	$C_3H_6O_2$	40	8	9
		41	8	8
Durol (K)	$C_{10}H_{14}$	41	8	1
Isoamyl acetate (A)	$C_7H_{14}O_2$	42	8	5
Safrol (C)	$C_{10}H_{10}O_2$	42	8	9
Citral (D)	$C_{10}H_{16}O$	48	8	7
Anethol (C)	$C_{10}H_{14}O$	52	8	7
Methyl butyrate (A)	$C_4H_8O_2$	57	8	9
Terpineol (E)	$C_{10}H_{16}O$	58	8	9
Eugenol (C)	$C_{10}H_{12}O_2$	79	8	9
Pseudocumene (K)	C_8H_{10}	85	8	7
Bornyl acetate (C)	$C_{12}H_{20}O_2$	10	9	1
Methylheptanone (A)	$C_8H_{16}O$	14	9	9
Ethyl butyrate (A)	$C_6H_{12}O_2$	15	9	9
Methyl acetate (A)	$C_4H_8O_2$	15	9	9
Carvone (C)	$C_{10}H_{14}O$	16	9	11
Caproic acid (L)	$C_6H_{12}O_2$	22	9	9
Ethyl succinate (A)	$C_8H_{16}O_4$	27	9	8
Methyl salicylate (C)	$C_9H_{10}O_3$	28	9	9
Xylene (K)	C_8H_{10}	39	9	9
Cresol (K)	C_7H_8O	46	9	1
Methylnonyl ketone (C)	$C_{11}H_{22}O$	50	9	9
Ethyl ether (A)	$C_4H_{10}O$	61	9	9
Aniline (K)	C_6H_7N	61	9	4
Camphor (C)	$C_{10}H_{16}O$	63	9	9
Amyl alcohol (K)	$C_5H_{12}O$	64	9	8
Safrol (C)	$C_{10}H_{10}O_2$	69	9	8
Phenol (K)	C_6H_6O	75	9	9
Butyl alcohol (K)	$C_4H_{10}O$	77	9	4
Ethyl ether (A)	$C_4H_{10}O$	82	9	8
Fenchone (C)	$C_{10}H_{16}O$	82	9	8
Acetaldehyde (A)	C_2H_4O	92	9	9
Citronellol (E)	$C_{10}H_{18}O$	96	9	9
Valeric acid (L)	$C_5H_{10}O_2$	11	10	9
Toluene (K)	C_7H_8	12	10	5
Ethyl isovalerate (A)	$C_7H_{14}O_2$	13	10	1
Trimethylamine (J)	C_3H_7N	21	10	9
Phenol (K)	C_6H_6O	22	10	9
Benzene (K)	C_6H_6	26	10	9
Acetone (A)	C_3H_6O	41	10	1
Acetic acid (L)	$C_2H_4O_2$	42	10	11
Propyl alcohol (K)	C_3H_8O	50	10	8
Acetic acid (L)	$C_2H_4O_2$	51	10	8
Toluidine (K)	C_7H_7N	71	10	9
Xylidine (K)	C_8H_9N	79	10	6
		10	11	6
		15	11	6
		16	11	6
		26	11	9
		30	11	6
		33	11	8
		73	11	5
		12	12	5
		24	12	4
		33	12	4
		84	12	9
		11	13	9
		19	13	8
		17	15	9

VALUE OF AN OLFACTY EXPRESSED AS DEGREE OF SATURATION
OF AIR WITH THE ODORIVECTOR

Substance	% Saturation	Substance	% Saturation
Lucalpytol	0.058	Methyl alcohol	1.388
Eugenol	0.144	Toluidine	1.515
Toluene	0.158	Ethyl alcohol	2.5
Benzene	0.169		

VALUE OF AN OLFACTY IN CM OF THE ZWAARDEMAKER
OLFACTOMETER

The constants of Zwaardemaker olfactometer are: width of cylinder, 0.8 cm; length, 10 cm; contents, 50 cc; air contact per cc of cylinder, 2.5 cm²; velocity of air in the air tube, 100 cc per sec (exposure, 0.33 sec).

MINIMUM PERCEPTIBLE IN CM OF OLFACTOMETER SCALE
Saturated solutions (9)

Substance	cm	Substance	cm
Terpineol—H ₂ O	0.01	Caproic acid—H ₂ O	0.10
Ethyl propionate—H ₂ O	0.02	Trinitroisobutyltoluene - H ₂ O	0.10
Ionone—H ₂ O	0.02	Guaiacol—H ₂ O	0.20
Camphor—H ₂ O	0.07	Trimethylamine—Paraffin	0.20

Aqueous solutions (10)

Substance	Concentration Wt. %	cm
Pyridine	0.05	0.1
Ethyl disulfide	0.02	0.5
Citral	0.01	0.2

Aqueous solutions (10).—(Continued)

Substance	Concentration Wt. %	cm
Scatole	0.01	0.4
Valeric acid	0.01	0.5
Isoamyl acetate	0.01	0.7
Guaiacol	0.0007	1.0

Paraffin solutions (11)

Substance	Concentration Wt. %	cm	Substance	Concentration Wt. %	cm
Borneol	1.0	0.001	Citral	1.0	0.09
Cadaverine	0.1	0.001	Isoamyl acetate	0.5	0.29
Scatole	0.1	0.002	Guaiacol	0.1	0.62
Ethyl sulfide	0.01	0.01	Ionone	0.0004	0.62
Pyridine	1.0	0.03	Safrol	3.0	1.12
Valeric acid	0.01	0.04	Terpineol	2.5	1.60
Nitrobenzene	5.0	0.06			

LITERATURE

(For a key to the periodicals see end of volume)

- (¹) Allison and Katz, *ib.*, 11: 330; 19. (²) Backman, *ib.*, 10: 351; 17. (³) Henning, *Der Geruch*, 1924. (⁴) Hermann, *Thesis, Utrecht*, 1907. (⁵) Heymans, *Thesis, Brussels*, 1919. (⁶) Huyer, *Thesis, Utrecht*, 1917. (⁷) Tempelaar, *Thesis, Utrecht*, 1913. (⁸) Zwaardemaker, *Physiol. des Geruchs*, 1898: 247. (⁹) Zwaardemaker, *Arch. Anat. Physiol., Physiol. Abt.*, 1900: 48.
(¹⁰) Zwaardemaker, *In Abderhalden, Handb. biol. Arbeit.*, 8, pt. 7: 455; 28.
(¹¹) Zwaardemaker, *In Tigerstedt, Handb. Physiol.*, 3, pt. 1: 49; 14. (¹²) Zwaardemaker, *Arch. Neerl. Physiol.*, 1: 347; 17.

RADIOACTIVITY

S. C. LIND, SPECIAL EDITOR

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1923 INTERNATIONAL TABLE RADIOACTIVE ELEMENTS AND THEIR CONSTANTS

λ (sec)⁻¹ is the radioactive constant of transformation.

$$dQ = -\lambda Q dt, \quad Q = Q_0 e^{-\lambda t}, \quad \log_{10} \frac{Q_0}{Q} = 0.4343 \lambda t,$$

in which Q_0 is the initial quantity and Q the quantity remaining after a time t (seconds).

$\lambda = -\frac{dQ}{Q dt}$ represents the fraction of the element transformed, reduced to the unit of time.

In the case of a double transformation, the values between brackets [] refer to the constants corresponding with the separate branches; the constant for both branches not being put between brackets.

The sign (?) indicates that the value has been indirectly deduced from the range of the α -rays expelled.

$\theta = \frac{1}{\lambda}$ is the average life of the radioactive atoms.

T is the half period, i.e., the time in which the quantity of radioelement is diminished to one half:

$$\lambda T = -\log_2 0.5 = 0.69315 \text{ and } \theta = 1.443 T$$

Radiation.—The brackets () indicate that the radiation is relatively feeble.

REMARKS CONCERNING THE NOMENCLATURE

It is desirable that the nomenclature adopted by the international commission should be accepted universally but that now put forward for the present year is provisional, to serve as a basis of discussion with the view to the adoption ultimately of a standard nomenclature.

The most important points are:

1. The three radioactive emanations have been given the names radon, actinon, and thoron, with the symbols Rn, An, Th, to suggest both their origin and their chemical character as members of the family of the rare gases of which the valency is zero;
2. In the branches which occur at the C members the sign (') has been used to indicate the products resulting from the emission of β -rays (isotopes of polonium) and the sign (") to indicate the products resulting from the emission of α -rays (isotopes of thallium);
3. The ultimate products have been indicated by the letter G.

EXPLANATION OF THE NOTES

NOTE 1.—*Uranium I.*—The value given for θ is that obtained from the equation:

$$\theta = \frac{1}{\lambda} = 2440 \times 0.97 \times 3 \times 10^8 \times \frac{226}{238} = 6.75 \times 10^8$$

in which the number 2440 represents the average life of radium in years, the number 0.97 the branching coefficient and $3 \times 10^8 \times \frac{226}{238}$ is the ratio between the numbers of atoms of uranium and radium in equilibrium in minerals.

If the actinium series is independent from that of uranium I, λ cannot be calculated by this method.

The value of λ obtained by the direct counting of the α -particles from a compound of uranium is 4.57×10^{-18} from which $\theta = 7 \times 10^8$ years and $T = 4.8 \times 10^8$ years.

NOTE 2.—*Uranium X₂* is also called brevium.

NOTE 3.—Radon replaces the names *radium emanation* and *niton* (the latter of which was proposed by Sir William Ramsay).

NOTE 4.—*Radium C* undergoes a double disintegration: 99.97% of the atoms emit β -rays and produce the substance Ra-C' which gives α -rays, and 0.03% of the atoms emit α -rays and produce the substance Ra-C'' which gives β -rays.

a_0 is the range in cm of the α -rays in air at 0°C and a pressure of 760 mm of mercury.

The range at r° C. and under p mm of mercury is

$$a = \frac{a_0(273 + r)760}{273p}$$

V is the velocity of α or β -rays relatively to that of light.

To convert to cm per sec multiply by 3×10^{10} .

For the α -rays:

$$V = 0.0342 a^{3/4}$$

μ_{Al} is the absorption coefficient of the β -rays in aluminium, the thickness being measured in cm.

μ_{Al} and μ_{Pb} are the absorption coefficients of the γ -rays in aluminium and lead respectively, the thickness being measured in cm; the latter is only given for the most penetrating type of γ -rays.

If I_0 is the initial intensity and I the intensity after the rays have traversed x cm of the absorbent:

$$I = I_0 e^{-\mu x} \quad \log_{10} \frac{I_0}{I} = 0.4343 \mu x$$

If D is the thickness corresponding with the absorption of one-half of the rays:

$$\mu D = 0.693$$

NOTE 5.—*Radium D* is also called radiolead.

NOTE 6.—*Radium C'* is also called radium C₂.

NOTE 7.—*Uranium Y* is the first known member of the actinium series. It may be derived from Uranium I or Uranium II. In this case, 3% of the atoms of Uranium produce the actinium family, and 97% the radium family.

The hypothesis has also been put forward that the actinium series may be produced independently from a third (hypothetical) isotope of Uranium for which the name actinouranium has been proposed.

NOTE 8.—*Protoactinium* is also called eka-tantalum.

NOTE 9.—A new radioactive substance named uranium Z₁ and isotopic with protoactinium, accompanies uranium in minute quantity. (25, 54B: 1131; 21). Its period is from 6 to 7 hours. It emits a β -radiation for which D_{Al} varies from: 0.0014 to 0.012. Its parent is an isotope of thorium, but it cannot yet be placed in the series.

NOTE 10.—*Actinon* is also called actinium emanation.

NOTE 11.—*Actinium C*. 0.2% of the α -rays emitted by this substance have a range $a_0 = 6.10$, instead of 5.12. From this it has been concluded that 0.2% of the atoms undergo a transformation by the emission of β -rays as is the case in the radium C and thorium C' branches (3, 27: 690; 14, 28: 818; 14). Confirmatory evidence appears to be desirable.

NOTE 12.—*Actinium C''* is also called actinium D.

NOTE 13.—*Thorium*. The value given for λ is that obtained from the direct counting of the α -particles emitted by a compound of thorium. All the other values are less; the smallest being 0.55 of that given in the table and giving $\theta = 3.45 \times 10^{10}$ years and $T = 2.37 \times 10^{10}$ years (63, 19: 259; 18).

NOTE 14.—*Thoron* is also called thorium emanation.

NOTE 15.—*Thorium C* undergoes a double disintegration: 65% of the atoms emit β -rays and produce the substance Th-C' which gives α -rays, and 35% emit α -rays and produce the substance Th-C'' which gives β -rays.

NOTE 16.—*Thorium C*. The value $a_0 = 4.69$ is that corresponding with $V = 0.0572$ which has been directly measured.

NOTE 17.—*Thorium C''* is also called thorium D.

NOTE 18.—*Potassium* and *rubidium* emit β -rays but show no other evidence of radioactivity.

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T	$\theta = \frac{1}{\lambda}$	$\lambda \text{ (sec)}^{-1}$	Name	Symbol	Atomic Wt.	No.	Isotope	Radiation	α_s	V	$\mu \beta \text{ Al}$	$\mu \gamma \text{ Al}$	$\mu \gamma \text{ Pb}$	Notes
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SERIES OF URANIUM AND RADIUM

4 67 × 10 ⁸ yrs	6 75 × 10 ⁸ yrs	4.7 × 10 ⁻¹⁶	Uranium I	U _I	238	92	U	α	2 37	0 0456				1
24 6 days	35.5 days	3 26 × 10 ⁻⁷	Uranium X ₁	U-X ₁	234	90	Th	β			463			
1 15 min	1.65 min	0.010	Uranium X ₂	U-X ₂	234	91	Pa	$\beta (\gamma)$			14 4	24; 0 7, 0 14	0 72	2
2 × 10 ⁸ yrs	3 × 10 ⁸ yrs	10 ⁻¹⁴ (?)	Uranium II	U _{II}	234	92	U	α	2 75	0 0479				
6 9 × 10 ⁴ yrs	10 ⁴ yrs	3.2 × 10 ⁻¹³	Ionium	Io	230	90	Th	α	2 85	0 0485				
1690 yrs	2440 yrs	1 30 × 10 ⁻¹¹	Radium	Ra	226	88	Ra	$\alpha (\beta + \gamma)$	3 13	α 0 0500, β 0 52, 0 65	512	354, 16; 0 27		3
3 85 days	5 55 days	2 085 × 10 ⁻⁸	Radon	Rn	222	86	Rn	α	3 94	0 0540				
3 0 min	4.32 min	3 85 × 10 ⁻³	Radium A	Ra-A	218	84	Po	α	4 50	0 0565				
26 8 min	38.7 min	4.30 × 10 ⁻⁴	Radium B	Ra-B	214	82	Pb	$\beta (\gamma)$		0 36, 0 41; 0 63, 0 70; 0 74	13 1, 80	230, 40, 0 51		
19 5 min	28 1 min	5 92 × 10 ⁻⁴	Radium C	Ra-C	214	83	Bi	99 97% β and γ		0 786, 0 852, 0 949, 0 957	13 2; 53	0 115	0 50	4
10 ⁻⁴ sec	10 ⁻⁴ sec	10 ⁴ (?)	Radium C'	Ra-C'	214	84	Po	α	6 57	0 0641				
16 5 yrs	23 8 yrs	1 33 × 10 ⁻⁸	Radium D	Ra-D	210	82	Pb	β and γ		0 33, 0 39	5500	45; 0 99		5
5 0 days	7 2 days	1 61 × 10 ⁻⁸	Radium E	Ra-E	210	83	Bi	β			43 3			
136 days	196 days	5 90 × 10 ⁻⁸	Radium F (Polonium)	Ra-F (Po)	210	84	Po	$\alpha (\gamma)$	3 58	0 0523		585		
			Radium G (Lead)	Ra G' Pb ²⁰⁸	206	82	Pb							
1 4 min	2 0 min	[1 8 × 10 ⁻⁷]	Radium C''	Ra-C	214	83	Bi	0 03% α	?					
		8 3 × 10 ⁻⁸	Radium C'''	Ra-C'''	210	81	Tl	β						6
			Radium U'' (hypothetical)	Ra U''	210	82	Pb							

SERIES OF ACTINIUM

1 04 days	1 5 days	7 8 × 10 ⁻⁶	Uranium ?	U-Y	?	92	U	α						7
1 2 × 10 ⁴ yrs	1 7 × 10 ⁴ yrs	1 9 × 10 ⁻¹²	Uranium Y	U-Y	?	90	Th	β						
20 yrs	28 8 yrs	1 1 × 10 ⁻⁸	Protoactinium	Pa	?	91	Pa	α	3 314	0 0510	About 300			8, 9
19 5 days	28.1 days	4 11 × 10 ⁻⁷	Actinium	Ac	?	89	Ac							
			Radioactinium	Rd-Ac	?	90	Th	$\alpha (\beta)$	4 36	α 0 0559; β 0 38, 0 43, 0 49, 0 53, 0 60, 0 67; 0 73	About 170	25, 0 19		
11 4 days	16 4 days	7 06 × 10 ⁻⁷	Actinium X	Ac-X	?	88	Ra	α	4 17	0 0550				
3 9 sec	5 6 sec	0 178	Actinon	An	?	86	Rn	α	5 40	0 0600				10
2 0 × 10 ⁻³ sec	2 9 × 10 ⁻³ sec	345	Actinium A	Ac-A	?	84	Po	α	6 16	0 0627				
36 1 min	52 1 min	3 2 × 10 ⁻⁴	Actinium B	Ac-B	?	82	Pb	β and γ			Very large	120; 31; 0 45		11
2 15 min	3 10 min	5 37 × 10 ⁻⁵	Actinium C	Ac C	?	83	Bi	α	5 12	0 0589				
4 71 min	6 83 min	2 44 × 10 ⁻⁵	Actinium C''	Ac-C''	?	81	Tl	β and γ			28 5	0 198	1.2 to 1 8	12
			Actinium U'' (hypothetical)	Ac U''	?	82	Pb							

SERIES OF THORIUM

1 31 × 10 ¹⁰ yrs	1.89 × 10 ¹⁰ yrs	1 68 × 10 ⁻¹⁸	Thorium	Th	232	90	Th	α	2 58	0 0469				13
6.7 yrs	9 67 yrs	3 28 × 10 ⁻⁹	Mesothorium 1	Ma-Th1	228	88	Ra							
6 2 hrs	8 9 hrs	3 12 × 10 ⁻⁵	Mesothorium 2	Ma-Th2	228	89	Ac	β and γ		0 37, 0 39, 0 43; 0 50; 0 57; 0 60; 0 66 and > 0 70	20 2 to 38 5	26; 0 116	0 62	
2 02 yrs	2 91 yrs	1 09 × 10 ⁻⁸	Radiothorium	Rd-Th	228	90	Th	$\alpha (\beta)$	3 67	α 0 0527; β 0 47; 0 51				
3 64 days	5 25 days	2 20 × 10 ⁻⁸	Thorium X	Th-X	224	88	Ra	α	4 08	0.0546				
54 sec	78 sec	0 0128	Thoron	Tn	220	86	Rn	α	4 74	0.574				14
0 14 sec	0 20 sec	5.0	Thorium A	Th-A	216	84	Po	α	5 40	0 0600				
10 6 hrs	15 3 hrs	1 82 × 10 ⁻⁵	Thorium B	Th-B	212	82	Pb	β and γ		0 63; 0 72	110	160; 32; 0 36		15
80 min	87 min	1 92 × 10 ⁻⁴	Thorium C	Th-C	212	83	Bi	65% β		(C + C'') 0 29, 0 36; 0 93 to 0 95	14 4			
10 ⁻¹¹ sec	10 ⁻¹¹ sec	1.25 × 10 ⁻⁴	Thorium C'	Th-C'	212	84	Po	α	8 16	0 0688				
		10 ⁻¹¹ (?)	Thorium U'	Th U'	208	82	Pb							
			Thorium U'' (Lead)	Th U''										
		[6.7 × 10 ⁻⁴]	Thorium C	Th-C	212	83	Bi	35% α	4 55	0 0572				16
3 1 min	4 5 min	3 70 × 10 ⁻⁵	Thorium C''	Th-C''	208	81	Tl	β and γ	74 69	(See Th-C)	21 6	0 090	0 45	17
			Thorium U''' (Lead)	Th U'''	208	82	Pb							
			Potassium	K	39 1	19	K	β			22 to 38			
			Rubidium	Rb	85 5	37	Rb	β			308 to 347			18

PHYSICAL PROPERTIES OF THE RADIOELEMENTS AND THEIR COMPOUNDS (Except Ra, Th, U and Rn)

GEORG HEVESY

1. Atomic Weights.—Io (mixture of Io + Th), 231.51 (2).

RaΩ (= U-Pb), 206.04 (2). ThΩ (= Th-Pb), 207.97.

2. Molecular Weights.—An (= Ac-Em), 220-232 (4). Th (= Th-Em), 201-210 (4). Rate of effusion method.

 3. Density (8).—RaΩ, 11.273 g cm⁻³ at 19.94°C.

4. Melting Point (26).—RaΩ', differs from Pb < 0.05°.

 5. Boiling Point (32).—Ra-FH₂, 37°C.

 6. Solubility.—S = solubility mol l⁻¹. α' = $\frac{C_{\text{Air}}}{C_{\text{H}_2\text{O}}}$. An (14),

 α' = 2 at 18°. Th (15), α' = 1 at 18°. Rn (16). S = 1.7989 (15b) in H₂O at 25°. S [RaΩ'(NO₃)₂] - S [Pb(NO₃)₂] < 10⁻⁴.

RELATIVE SOLUBILITY OF AN IN DIFFERENT SOLVENTS AT 18°

H ₂ O	Sat. KCl soln.	Conc. H ₂ SO ₄	C ₂ H ₅ OH	C ₂ H ₅ OH	C ₂ H ₅ CHO	C ₂ H ₆	C ₂ H ₅ CH ₃	Kerosene	C ₂
1	0.9	0.95	1.11	1.6	1.7	1.7	1.8	1.9	2.1

7. Rate of Solution.

PERCENT DISSOLVED FROM SURFACE AT 18°

By H ₂ SO ₄ in 15 sec (17)					
H ₂ SO ₄ , equiv. per liter =					
	10 ⁻¹	10 ⁻²	10 ⁻³	10 ⁻⁴	1
Ra-B from glass	80	80	97	88	
Ra-C from glass	28	60	88	99	
By HNO ₃ in 60 sec (18)					
HNO ₃ , equiv. per liter =					
	0	10 ⁻⁶	10 ⁻⁴	10 ⁻³	10 ⁻² 1
Th-B from quartz	60	61	60	80	81 83 84
Th-C from quartz	37	38	35	61	72 77 87

PERCENT RA-B AND RA-C DISSOLVED FROM GLASS SURFACE (17)

By H ₂ O in 5 min					
t	Ra-B	Ra-C	t	Ra-B	Ra-C
0°	0.20	0.19	42°	0.78	0.67
17°	0.47	0.35	70°	0.97	0.91
By H ₂ SO ₄ in 15 sec					
t	Ra-B	Ra-C	t	Ra-B	Ra-C
0°	0.74	0.52	42°	0.895	0.71
17°	0.80	0.60	70°	0.96	0.81

8. Adsorption.—Ratio of molal conc. in gas at equilibrium to moles adsorbed per liter of charcoal at 18°. An (19) 0.05, Th (20) 0.02. Percent of initial amount present (per 50 cc of solution) adsorbed by 1 g of adsorbent (21). (a) By BaSO₄, from 0.1 N HCl, Th-B 81, Th-C 32; from 0.1 N KOH, Th-B 20, Th-C 64; from 0.1 N NH₃, Th-B 100, Th-C 86. (b) By Cr₂O₃, from 0.1 N HCl, Th-B 2.5, Th-C 69. (c) By AgBr, from 0.1 N HBr, Th-B 81, Th-C 34. (d) By BaSO₄, from 1 N HCl, Ra 80. (e) By Cr₂O₃, from 1 N HCl, Ra 0. (f) By AgCl, from 1 N HCl, Ra 0.

9. Vapor Pressure.—p_{100°} for RaΩ' is 2% greater than for Pb (22).

10. Temperature of Volatilization.—Depends on nature of surface and chemical state of the radioactive element. v. (23, 24, 25).

11. Coefficient of Diffusion.

(a) IN GASES AT 76 CM AND 15°

An, in	Air	H ₂	CO ₂	SO ₂	A
Δ, cm ² sec ⁻¹	0.098-0.123	0.330	0.412	0.075	0.062-0.107
	(6, 7, 8, 9)	(7)	(8)	(7, 8)	(7)
Th, in	Air		A		
Δ, cm ² sec ⁻¹	0.085-0.103		0.084		
	(6, 7, 9)		(7)		

(b) THE CATIONS IN WATER (10) AT 18°

Ion	UX ₁ ⁺⁺	Io ⁺⁺	Ra-D ⁺⁺	Ra-E ⁺⁺⁺	Ra-F ⁺⁺	Ac ⁺⁺⁺
Δ, cm ² day ⁻¹	0.4	0.33	0.65	0.45	0.76	0.46
Ion	AcX ⁺⁺	Rd-Th ⁺⁺	ThX ⁺⁺	Th-B ⁺⁺	Th-C ⁺⁺	
Δ, cm ² day ⁻¹	0.69	0.33	0.66	0.67	0.5	

Th-Cl₃ in $\frac{1}{2}$ N NH₃, Δ = 0.37. Ra-FCl₂ in $\frac{1}{2}$ N NH₃, Δ = 0.19.

(c) IN METALS. Δ IN CM² DAY⁻¹

	l	Δ
Th-B in Pb	343°	2.2 (11)
Ra-D in Pb	280°	< 10 ⁻⁴ (12)
Ra-F in Pb	280°	< 10 ⁻⁴ (12)
Ra-F in Au	470°	ca. 10 ⁻⁹ (13)
Ra-B + Ra-C in Ag	470°	3.8 × 10 ⁻⁷ (13)
Ra-B in Au	470°	8.2 × 10 ⁻⁷
Ra-B in Pt	470°	3.4 × 10 ⁻⁷

In re diffusion of Th-B in single crystals, in lead foils and in thallium foils v. (35).

12. Refractive Index (27).—n_D²⁰ for cryst. RaΩ'(NO₃)₂ = 1.7814.

13. X-ray Spectra.—All lines of the L series and the Mα and Mβ lines of RaΩ' differ by less than 5 × 10⁻¹² cm from the same lines for Pb (28).

14. Relative Ionic Mobilities (10).—In capillary tubes by comparison against Ra (A = 57.3 mhos).

Cation	Ra	Ra-C	Ra-D	Ra-E	Ra-F	AcX	ThX	Th-B	Th-C
A	57.3	54.5	61.9	61.9	68.8	56.1	58.0	55.4	54.0

15. Emf.—RaΩ' / N RaΩ'(NO₃)₂ // N Pb(NO₃)₂ / Pb. < 0.1 millivolt (31).

16. Deposition Voltage.—From $\frac{1}{10}$ N HNO₃ containing 10⁻³ mole Ra-F, cathodic deposition occurs on Au electrodes at E_{H₂} = 0.35 volt, anodic at E_{H₂} = 1.05 volt (30).

LITERATURE AND REMARKS

(For the key to periodicals see end of volume)

- (1) Hönigschmid, 9, 22: 21; 16. This mixture contained about 30% Io and 70% Th and was probably contaminated with some Th not present in the pure pitchblende (cf. Soddy and Hitchins, 3, 47: 1148; 24. Meyer and Ulrich, 75, 122: 279; 23). (2) Lowest value found. Higher values probably due to presence of lead. Richards and Lambert, 1, 36: 1329; 14, 95, 66: 429; 14. Hönigschmid and Horowitz, 75, 123: 2407; 14, 9, 20: 319; 14. Curie, 34, 146: 1676; 14. 198, 84: 586; 23. Richards, Ann. Rep. Smithsonian Inst. 1910: 205. Richards and Putseys, 1, 44: 2954; 23. (3) Highest value found. Lower values probably due to presence of lead and RaΩ. Hönigschmid, 9, 22: 91; 10. Soddy, 4, 108: 1402; 14, 68, 94: 615; 15, 98: 469; 17, 99: 244; 17. (4) Leslie, 4, 84: 637; 12, 34,

- 183; 328; 11. Marsden and Wood, 4, 20: 445; 13. (*) Richards and Wadsworth, 1, 88: 221, 1658; 16. Cf. Soddy, 58, 107: 41; 21. Egerton and Lee, 5, 103: 487; 23. (*) Rutherford, "Radioactivity," Cambridge, 1913, p. 387. (7) Russ, 4, 17: 540; 09. (*) B. Bruhat, 199, 6: 67, 09. (8) Deberne, 199, 4: 213; 07. McLennan, 2, 30: 660; 10. Eckmann, 300, 9: 177; 12. Thomson, 301, 18: 377; 09. Hevesy, 300, 10: 198; 13. (*) Leslie, 34, 183: 328; 11. Rutherford, l.c.
- (10) Hevesy, 63, 14: 49, 1202; 13. 4, 20: 586; 14. Paneth, 75, 123: 1636, 13. The radioelements probably present in colloidal state. (11) Gr6h and Hevesy, 8, 63: 85; 20. Diffusion rate of a mixture of Th-B and Pb in lead. Th-B used as indicator. (12) Gr6h and Hevesy, 8, 63: 216, 21. Diffusion rate of a mixture of Ra-D and Pb in lead. (13) Wertenstein and Dobrowolska, 51, 4: 324; 23. Diffusion rate of active deposit (probably of oxides). (14) Hevesy, 63, 13: 1214; 11. 60, 16: 429, 12. (15) Klaus, 63, 6: 820; 05. Boyle, *Macedonald Phys. Build. Bull.*, No. 1: 52, 10. α of short-lived An and Th determined by making assumptions only partly justified. α of An and Th probably practically identical with that of Rn. (16) Richards and Schumb, 1, 40: 1403; 18. The RaF' used contained some common lead, its atomic weight being 206.34. The solubility of common lead (at. wt. 207.19) was found by the same authors to be 1.7993. Cf. Fajans and Lombert, 85, 95: 297; 16. (17) Ramstedt, 147, II: No. 21; 13. Cf. Arrhenius, 189, 7: 228, 10. Godlewski, 199, 10: 250; 13. Schr6der, 4, 24: 131; 12. Hevesy, 9, 19: 201; 13. (18) Hevesy and Rona, 7, 99: 294; 15. *In re* Ra-F, cf. Paneth and Hevesy, 75, 123: 1050; 13. (19) Hevesy, 63, 13: 9; 12. 60, 18: 429; 12.
- (20) Boyle, 4, 17: 389; 09. Ra-B and Th-B between Pb amalgam and $\text{Hg}(\text{NO}_3)_2$; cf. Z. Klemensiewicz, 54, 168: 1889; 14. (21) Paneth, 63, 15: 924,

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ARTIFICIAL DISINTEGRATION OF THE ELEMENTS

G. RUDOLF

Disintegration by the splitting off of positively charged hydrogen nuclei by the action of rapidly moving α -particles.

(a) Disintegration obtained with B, N, F, Ne, Na, Mg, Al, Si, P, S, Cl, A, K (1, 2, 3, 5).

(b) No disintegration obtained with H, He, Li, C, O, Ni, Cu, Zn, Se, Kr, Mo, Pd, Ag, Sn, X, Au, U (2, 3, 5).

(c) Doubtful, Be (4, 5).

LITERATURE

(For a key to the periodicals see end of volume)

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ELECTRON EMISSION PRODUCED BY RADIATION FROM RADIOACTIVE SUBSTANCES

PIERRE AUGER

RELATIVE IONIZATION OF GASES BY PO α -RAYS HAVING A 3.8 CM RANGE (1)

Gas	Air	O ₂	N ₂	CO ₂	Illuminating gas
<i>I</i>	1	1.12	0.97	1.23	0.38

RELATIVE MOLECULAR IONIZATION OF GASES BY β AND γ RAYS (2)

Gas	Air	H ₂	O ₂	NH ₃	N ₂ O	CO ₂	C ₂ N ₂	SO ₂	CS ₂	C ₆ H ₁₂
<i>Iβ</i>	1	0.16	1.17	0.89	1.55	1.60	1.86	2.25	6.2	4.55
<i>Iγ</i>	1	.16	1.16	.90	1.55	1.58	1.71	2.27	3.66	1.53

Gas	C ₂ H ₆	CH ₃ OH	CH ₃ Br	CHCl ₃	CHI ₃	CCl ₄	C ₂ H ₄ O
<i>Iβ</i>	3.95	1.69	3.73	4.94	5.11	6.28	2.12
<i>Iγ</i>	3.94	1.75	3.81	4.93	5.37	6.33	2.17

Gas	C ₂ H ₅ Cl	C ₂ H ₅ Br	C ₂ H ₅ I	(C ₂ H ₅) ₂ O	Ni(CO) ₄
<i>Iβ</i>	3.24	4.41	4.39	5.90	
<i>Iγ</i>	3.19	4.63	4.29	6.47	5.98

RESIDUAL IONIZATION AS DEPENDENT ON THE PRESSURE

Ionization from the walls (a secondary radiation) in air confined for 10 days. N_I = number of ions per cm³ per sec (3).

RANGE OF EMITTED HYDROGEN NUCLEI (2, 3, 5)

Element	Forward range in cms	Backward range in cms
B	58	38
N	40	18
F	65	48
Na	58	36
Al	90	67
P	65	49
Mg, Si, S, Cl, A, K	18-30	
Ne	16	

The values for B, F, Na, P are possibly somewhat in error (3) but are certainly greater than 40 (3).

P. atm.	0	10	20	27	40	46	50	60
N_I	0	17	30	38	46	50	50	50

NUMBER OF ELECTRONS (δ -RAYS) LIBERATED BY α -RAYS

l = thickness of metal traversed. N_E = electrons emitted per incident particle (4).

$10^5 l$ (g cm ⁻²)	In Al					In Ag		In Au	
	81	162	243	324	410	492	570	28.5	501
N_E	11	9	14	2	15	0	17	2	17

PAIRS OF IONS PRODUCED BY α -RAYS

If R_0 cms is the range of the α -particle in air, it will produce n pairs of ions. $n = n_0 R_0^{2.5}$, where $n_0 = 6.233 \times 10^4$. Direct measurement for Ra-C' gives $n = 2.20 \times 10^4$ (5).

ENERGY

Energy of electrons (Sec. β -rays) emitted by metals subjected to the action of γ -rays from Ra(C + E). Three groups of rays (6).

Metal	Pb	Pt	W	U	Ba
Atomic number	82	78	74	92	56
Energy of the secondary rays. Volts $\times 10^{-4}$.	1.49	1.58	1.66	1.22	2.53
	2.03	2.12	2.20	1.74	
	2.60	2.69	2.76	2.31	

SECONDARY β -RAY VELOCITIES

Pb subjected to the action of γ -rays from Ra-B has been found to emit the following secondary β -rays:

$$RH = \frac{mu^2}{s(1-\beta^2)} = 3610, 3250, 2990, 2735, 2225, 2130, 2000, 1935, 1825, 1750, 1620, 1560, 1400, 1240, 1150, 1010, 950, 820, 800 \text{ (}^6\text{)}.$$

ABSORPTION

Absorption of the secondary β -rays emitted by metals when subjected to the radiation from Ra(B + C). μ for the hard rays, μ_s for the soft rays. Absorbing screen, Al (7).

Metal.....	Ag	Al	Au	Cu	Fe	Ni	Pb
μ , cm ⁻¹	69	14	118	35	41	52	118
μ_s , cm ⁻¹	207	52.5	345	105	165	165	345

LITERATURE

(For a key to the periodicals see end of volume)

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ENERGY OF RADIOACTIVE PROCESSES

STEFAN MEYER

HEAT PRODUCTION OF RADIOACTIVE SUBSTANCES

Joules per hour per gram of the radioactive element and the decay products in equilibrium therewith. (1 Joule = 0.2390 g-cal.)

Substance	Rays	Meyer & Hess(4)	Hess(2)	Rutherford & Robinson (7)
Ra.....	α and recoil	573	105 5	105 0
Rn.....	α and recoil		467 7	119 7
Ra-A.....	α and recoil			127 6
Ra-B + Ra-C.....	α and recoil and β , γ			211 3
Total.....		573	573	565

Substance	Heat	Lit.
Th.....	10.0×10^{-4}	(5)
U.....	4.2×10^{-4}	(5)
Pitchblende (ca. 64% U).....	27.2×10^{-4}	(5)

Ellis and Wooster (1) have determined the γ -heat effect of Ra-B to be 3.6; Ra-C, 32.2; total, 36 joules/h. Calculations of the heat effect of β - α and γ -rays have been made by Meitner (3) and Thibaud (5).

LITERATURE

(For a key to the periodicals see end of volume)

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CHEMICAL EFFECTS OF α -PARTICLES

S. C. LIND AND D. C. BARDWELL

M is the total number of molecules reacting (on the left hand of the equation, first column); N is the total number of ion pairs produced in the reactants by α -particles.

$$\frac{M}{N} = \left(\frac{k\mu}{\lambda} \right)' \cdot \frac{V}{D \cdot F \cdot G \cdot H} \times 1.66 \times 10^3$$

V = volume in cm³ of, and D = diameter in cm of, the reaction sphere.

F = average intensity of ionization (1). G = specific molecular ionization (air = 1).

$H = (\alpha + R)/\alpha$ where α and R are α -ray and recoil atom effects resp. (2).

$$\left(\frac{k\mu}{\lambda} \right)' = \left(\ln \frac{P_1}{P_2} \right) + [E_0(e^{-\lambda t_1} - e^{-\lambda t_2})] \quad (3)$$

where E_0 = initial radon (in curies), P = pressure (mm Hg), λ = decay constant of radon (in reciprocal days) and t = time (in days).

Where the quantity of gas in the reaction vessel at atmospheric pressure exceeds the air equivalent of a bulb 2.5 cm in diameter, the ionization is calculated by equations developed by W. Mund (17), slightly modified:¹

¹ The modified equation is derived by correcting the integration of Mund's function $\phi(r) = \int_0^{2R} (r-x)^{3/2} x dx$ (equation 5, p. 340). In the large bulbs used by Mund no error was introduced by employing his equation since $2R > r$.

$$I = N_0 (1 - e^{-\lambda t}) k \left[r^{3/2} + \frac{1}{2} r'^{3/2} + \frac{1}{2} r''^{3/2} - \frac{3}{20R} \left\{ 3r^{5/2} + r'^{5/2} + r''^{5/2} - 3(r-2R)^{5/2} - (r'-2R)^{5/2} - (r''-2R)^{5/2} \right\} + \frac{81r^{1/2}}{3520R^2} - \frac{27}{160} (r-2R)^{3/2} \left\{ \left(\frac{r-2R}{R} \right)^2 + 3 \left(\frac{r-2R}{R} \right) \right\} \right]$$

I = Number of ions produced by the three sets of α -particles in the time t .

N_0 = Number of atoms of radon present initially ($t = 0$) (1 curie = 1.772×10^{14} atoms Rn)

R = Radius of reaction bulb in cms.

λ = Decay constant of radon (as above)

$k = 6.67 \times 10^4 \frac{\text{ions}}{\text{cm}^3}$ = ionization constant per α -particle as a function of the range (5); $i = kr^{3/2}$ or $kr'^{3/2}$ or $kr''^{3/2}$ for Rn, Ra-A, and Ra-C, resp. (air at 760 mm and 0°C)

r, r', r'' = ranges of α -particles from Rn, Ra-A, and Ra-C, resp. Wourtsel's (12) M/N values are recalculated by the Mund equation

The values adopted for the number of α -particles per sec per g of radium, and the total ions from one α -particle of Ra-C in its completed path in air are respectively, for column (a) 3.72×10^{10} (4) and 2.37×10^5 (5), and for (b) 3.40×10^{10} (6, 7) and 2.20×10^5 (8). Other combinations of these numbers give intermediate values of M/N .

Reaction <i>l</i> = liquid, <i>g</i> = gas, <i>s</i> = solid	$\frac{M}{N}$		Lit.
	(a)	(b)	
$2\text{H}_2\text{g} + \text{O}_2\text{g} \rightarrow 2\text{H}_2\text{Ol}$ Dry or moist; at 25°C to -75°C	5.13	6.05	(9, 10)
$2\text{H}_2\text{Ol} \rightarrow 2\text{H}_2\text{g} + \text{O}_2\text{g}$	0.86	1.01	(11)
$2\text{H}_2\text{Og} \rightarrow 2\text{H}_2\text{g} + \text{O}_2\text{g}$	1.05	1.24	(11)
$2\text{H}_2\text{Os} \rightarrow 2\text{H}_2\text{g} + \text{O}_2\text{g}$	<0.01	<0.01	(11)
$\text{CO}_2\text{g} \rightarrow 1\%$ disappearance of gas, no decomposition products	0.05	0.06	(11)
$\text{COg} \rightarrow \text{CO}_2\text{g} + \text{CnOms} + \text{Cs}$	5×10^{-3}	6×10^{-3}	(18)
$2\text{COg} + \text{O}_2\text{g} \rightarrow 2\text{CO}_2\text{g}$ at room temperature	1.85	2.18	(19)
$2\text{COg} + \text{O}_2\text{g} \rightarrow 2\text{CO}_2\text{g}$ at liquid air temp.	5.7	6.7	(18)
$\text{COg} + \text{H}_2\text{g} \rightarrow \text{carbohydrate s}$	>3.1	>3.7	(18)
$\text{CO}_2\text{g} + \text{H}_2\text{g} \rightarrow \text{carbohydrate s} + \text{H}_2\text{Ol}$	3.13	3.7	(18)
$\text{CO}_2\text{g} + \text{CH}_4\text{g} \rightarrow \text{carbohydrate s} + \text{H}_2\text{Ol}$	1.44	1.70	(18)
$\text{CH}_4\text{g} \rightarrow \text{H}_2\text{g} + \text{hydrocarbons g, l and s}$	0.76	0.90	(10)
$\text{C}_2\text{H}_2\text{g} \rightarrow \text{H}_2\text{g} + \text{hydrocarbons g, l and s}$	2.0	2.4	(10)
$\text{C}_2\text{H}_4\text{g} \rightarrow \text{H}_2\text{g} + \text{hydrocarbons g, l and s}$	1.7	2.0	(10)
$\text{C}_2\text{H}_6\text{g} \rightarrow \text{H}_2\text{g} + \text{hydrocarbons g, l and s}$	1.5	1.8	(10)
$\text{C}_2\text{H}_2\text{Ol} + \text{H}_2\text{g} + \text{hydrocarbons g, l and s}$	1.4	1.6	(10)
$\text{CH}_4\text{g} + 2\text{O}_2\text{g} \rightarrow \text{CO}_2\text{g} + \text{H}_2\text{Ol}$	4.4	5.2	(10)
$\text{CH}_4\text{g} + 2\text{O}_2\text{g} + [1 \text{ mol } (\text{C}_2\text{H}_5)_2\text{Se}] \rightarrow \text{CO}_2\text{g} + \text{H}_2\text{Ol}$	5.7	6.7	(10)
$2\text{C}_2\text{H}_5\text{g} + 7\text{O}_2\text{g} \rightarrow \text{CO}_2\text{g} + \text{H}_2\text{Ol}$	6.8	8.0	(10)
$(\text{CN})_2\text{g} \rightarrow \begin{cases} 5\% \text{ to } \text{N}_2\text{g} \text{ and } \text{Cs} \\ 95\% \text{ to paracyanogen s} \end{cases}$	7.8	9.2	(12)
$2\text{NH}_3\text{g} \rightarrow \text{N}_2\text{g} \text{ and } 3\text{H}_2\text{g}$	$\begin{cases} 18^\circ & 1.01 & 1.19 \\ 25^\circ & 1.0 & 1.2 \\ 108^\circ & 2.0 & 2.35 \\ 220^\circ & 2.92 & 3.44 \\ 315^\circ & 3.15 & 3.80 \end{cases}$	$\begin{cases} 18^\circ & 1.01 & 1.19 \\ 25^\circ & 1.0 & 1.2 \\ 108^\circ & 2.0 & 2.35 \\ 220^\circ & 2.92 & 3.44 \\ 315^\circ & 3.15 & 3.80 \end{cases}$	$\begin{cases} (13) \\ (10) \\ (13) \\ (13) \\ (13) \end{cases}$
$\text{H}_2\text{Sg} \rightarrow \text{H}_2\text{g} + \text{Ss}$	$\begin{cases} 18^\circ & 3.40 & 4.00 \\ 95^\circ & 2.80 & 3.30 \\ 220^\circ & 2.38 & 2.80 \end{cases}$	$\begin{cases} 18^\circ & 3.40 & 4.00 \\ 95^\circ & 2.80 & 3.30 \\ 220^\circ & 2.38 & 2.80 \end{cases}$	$\begin{cases} (13) \\ (13) \\ (13) \end{cases}$
$\text{H}_2\text{Ss} \rightarrow \text{H}_2\text{g} + \text{Ss}$	$\begin{cases} -190^\circ & 3.7 & 4.7 \\ -78^\circ & 2.74 & 3.23 \end{cases}$	$\begin{cases} -190^\circ & 3.7 & 4.7 \\ -78^\circ & 2.74 & 3.23 \end{cases}$	$\begin{cases} (13) \\ (13) \end{cases}$
$\text{N}_2\text{Og} \rightarrow \begin{cases} \text{N}_2\text{g} + \text{O}_2\text{g} \\ \text{N}_2\text{g} + \text{NOg} \end{cases}$	$\begin{cases} 18^\circ & 2.21 & 2.61 \\ 220^\circ & 2.95 & 3.48 \end{cases}$	$\begin{cases} 18^\circ & 2.21 & 2.61 \\ 220^\circ & 2.95 & 3.48 \end{cases}$	$\begin{cases} (13) \\ (13) \end{cases}$
$\text{H}_2\text{g} + \text{Cl}_2\text{g} \rightarrow 2\text{HClg}$	4000	4700	(14)
$2\text{HClg} \rightarrow \text{H}_2\text{g} + \text{Cl}_2\text{g}$	$\begin{cases} 0.76 & 0.90 \\ 1.24 & 1.46 \end{cases}$	$\begin{cases} 0.76 & 0.90 \\ 1.24 & 1.46 \end{cases}$	$\begin{cases} (15) \\ (10) \end{cases}$
$\text{H}_2\text{g} + \text{Br}_2\text{g} \rightarrow 2\text{HBrg}$	0.54	0.64	(16)
$2\text{HBrI} \rightarrow \text{H}_2\text{g} + \text{Br}_2\text{g}$	2.6	3.1	(16)
KI in acid soln.—free I	0.76	0.90	(16)

Reaction <i>l</i> = liquid, <i>g</i> = gas, <i>s</i> = solid	$\frac{M}{N}$		Lit.
	(a)	(b)	
$x\text{HCN} \rightarrow (\text{HCN})_x\text{s} + 5\% \text{N}_2\text{g}$	10.5	12.4	(12)
$\text{C}_2\text{N}_2\text{g} + \text{O}_2\text{g} \rightarrow \begin{cases} 63\% \rightarrow (\text{CNO})_2\text{s} \\ 37\% \rightarrow \text{CO}_2\text{g} + \text{N}_2\text{g} \end{cases}$	7.2	8.5	(10)
$\text{C}_2\text{N}_2\text{g} + \begin{cases} 67\% \text{C}_2\text{N}_2 \rightarrow (\text{HCN})_2\text{s} \\ \text{H}_2\text{g} \rightarrow 33\% \text{C}_2\text{N}_2 \rightarrow (\text{C}_2\text{N}_2)_2\text{s} \end{cases}$	6.8	8.0	(10)
$\text{C}_2\text{H}_2\text{g} \rightarrow \text{H}_2\text{g} + \text{hydrocarbons g, l, and s}$	5.0	5.9	(10)
$\text{C}_2\text{H}_2\text{g} \rightarrow (\text{C}_2\text{H}_2)_2\text{s} + 2\% \text{H}_2\text{g}$	19.5	23.0	(10)
$\text{C}_2\text{H}_2\text{g} \rightarrow (\text{C}_2\text{H}_2)_2\text{s} + 1\% \text{H}_2\text{g}$	20.5	24.2	(10)
$\text{C}_2\text{H}_2\text{g} + \text{H}_2\text{g} \rightarrow (\text{C}_2\text{H}_2)_2\text{s} \text{ (11\% H}_2 \text{ reacted)}$	19.6	23.1	(10)

Catalytic Effect of Inert Gases (10, 20, 21)

The $-M/N$ values in the table below give the total number of molecules of reactants disappearing for each ion pair of both

catalyst and reactants. Example: $\frac{M}{N} = 18.7$, means

that 18.7 molecules of C_2H_2 polymerize to $(\text{C}_2\text{H}_2)_x\text{s}$ for each ion pair whether formed in the reactant or in the catalyst. With the increasing ratio of catalyst to reactant, a decrease in the $-M/N$ is indicated—probably attributable to exhaustion effects. Values by the (a) method only are given.

Reactants	Catalysts							
	Pure gas	N_2	H_2	Ne	Ar	Xe	CO_2	H_2
C_2H_2	10.5	18.7	20.1	19.6	18.2	18.5	17.4	19.6
		to	to	to	to			
		17.8	17.0	16.3	15.0			
C_2N_2	7.2	7.2				7.2		reacts
HCN	10.8	10.0				10.0		
$2\text{H}_2 + \text{O}_2$	5.13	5.0						reacts
$2\text{CO} + \text{O}_2$	5.7				3.9			none

LITERATURE

(For a key to the periodicals see end of volume)

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SATURATION CURRENT. ABSORPTION IN LIQUIDS AND SOLIDS

STEFAN MEYER

SATURATION CURRENT AND NUMBER OF IONS FOR α -RADIATORS

The saturation current is $I_s = Zke$ where Z = number of α -particles per sec per unit mass, k = number of ion-pairs per α -particle and $e = 4.774 \times 10^{-10}$ es.

Number of Ions, k

Based on the values of Ra-C' and the following alternative Z values for 1 g of Ra : (a) $Z_{\text{Ra}} = 3.72 \times 10^{10}$ (19, 26); (b) $Z_{\text{Ra}} = 3.45 \times 10^{10}$ (12).

$$k = A \times 10^4 \text{ (9, 11, 13, 15, 45, 47)}$$

Element	A		Element	A	
	(a)	(b)		(a)	(b)
U_I	1.16	1.25	An	1.95	2.10
U_{II}	1.27	1.37	Ac-A	2.12	2.28
Io	1.31	1.41	Ac-C	1.88	2.03
Ra	1.36	1.47	Ac-C'	(2.09?)	(2.25?)
Rn	1.55	1.67	Th	1.23	1.32
Ra-A	1.77	1.83	Rd-Th	1.53	1.64
Ra-C	(1.47?)	(1.58?)	Th-X	1.61	1.73
Ra-C'	2.20*	2.37*	Th	1.78	1.92
Po	1.50	1.62	Th-A	1.92	2.07
Pa	1.44	1.55	Th-C	1.71	1.85
Rd-Ac	1.69	1.82	Th-C'	2.64	2.73
AcX	1.61	1.74			

* Basic values.

The value of $Z_U = Z_{U_I} + U_{II}$ may be obtained from Z_{Ra} and the basic equilibrium ratio $Z_{Ra}/Z_U = 3.4 \times 10^{-7}$.

The value of Z_{Th} may be calculated from the decay constant of Th. For the following assumed values of the half-life, $T_{1/2}$, of Th we find for Z_{Th} : 1.25×10^{10} yrs, $4.5 \times 10^3 \alpha \text{ sec}^{-1}$; 1.65×10^{10} , $3.4 \alpha \text{ sec}^{-1}$; and 2.2×10^{10} , $2.6 \alpha \text{ sec}^{-1}$.

Saturation Current

1. (In Electrostatic Units) (2, 3, 4, 5, 6, 7, 8, 20, 26, 31, 32, 34, 43)

Element	U_I	U_{II}	Io	Ra	Rn	Ra-A	$\frac{99.96\%}{Ra-C'}$	Po
In equilibrium with 1 g U	$I_s =$	1.47	0.79	0.82	0.94	1.03	1.33	0.91
1 g Ra	$I_s \times 10^{-4} =$	4.31	2.33	2.12	2.75	3.02	3.91	2.63

2. On the basis of a branching ratio of 3% for the Ac family in equilibrium with 1 g Ra (1, 2, 10, 15, 16, 17, 23, 30, 33, 38, 41).

Element	Pu	Rd-Ac	Ac-X	An	Ac-A	$\frac{99.7\%}{Ac-C'}$
$I_s \times 10^{-4} =$	7.93	9.09	8.86	10.7	11.7	10.4

3. 1 g U in ores [i.e. U + 97% (Io → Ra-G) + 3% (Pu → Ac-D)] is equivalent to $I_s = 7.30$; 1 g ($U_3O_8 \rightarrow Ra-G$) to $I_s = 6.2$; and 1 g average ore with 50% U_3O_8 to $I_s = 3.1$.

4. 1 curie Rn is equivalent to $I_s = 2.75 \times 10^6$ and 1 curie Rn with $\frac{1}{2}$ (Ra-A + Ra-C') to $I_s = 6.2 \times 10^6$.

5. In equilibrium with 1 g Th and based on the following alternative Z values for 1 g Th: (a), $Z_{Th} = 4.5 \times 10^3 \alpha \text{ sec}^{-1}$ and (b), $Z_{Th} = 3.4 \times 10^3 \alpha \text{ sec}^{-1}$.

Element	Th	Rd-Th	Th-X	Tn	Th-A	$\frac{35\%}{Th-C'}$	$\frac{65\%}{Th-C'}$
$I_s =$	(a) 0.204	0.320	0.346	0.382	0.413	0.129	0.355
	(b) 0.200	0.248	0.261	0.289	0.312	0.097	0.263

RANGE OF α -PARTICLES IN LIQUIDS AND SOLIDS

All values in microns, $\mu = 10^{-4} \text{ cm}$

A. IN LIQUIDS

Liquid	From Po (21)	From Ra-C' (27, 44)
$C_2H_5OC_2H_5$	43	0.37
C_2H_5OH	1.36	7.36
CS_2	3.34	3.33
C_2H_6	0.32	0.27
$CHCl_3$	0.27	0.7
$C_2H_5NH_2$	0.7	0.57
H_2O	0.27	0.57
C_2H_5OH	0.27	0.57
C_2H_5OH	0.27	0.57
C_2H_5N	0.27	0.57
H_2O	0.27	0.57

B. IN SOLIDS

From Ra-C' (49, 50, 51)

Solid	Li	Mg	Al	Ca	Fe	Ni	Cu	Zn
R_{150}	120	57	40	78	18	18	18	22
R_{150}	120	57	40	78	18	18	18	22
Solid	Ag	Cd	Sn	Pt	Au	Tl	Pb	
R_{150}	10	2	24	29	4	12	8	14

C. IN PHOTOGRAPHIC PLATES

Source	Ra-A	Ra-C'	Th-C'	Po
Type of plate	Ilford	Sigurd (Jahr)	Ilford	Sigurd
R_{150}	34.8	50.0	50.7	54
Lit.	(31)	(36)	(21)	(21)
			48.2	27
			(22)	7
				(36)
				(38)

D. PLEOCHROITIC HALOES v. (53)

STOPPING POWER EQUIVALENTS OF AIR AND METALS AT DIFFERENT PARTS OF THE PATH OF AN α -RAY

Milligrams per cm^2 of foil equivalent to 1 cm air lying between the distances given, measured from end of range. 15°C and 1 atm. (29).

Distances cms	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Al	1.90	1.71	1.65	1.64	1.63	1.62	1.62
Ag	3.805	3.28	3.10	3.01	2.93	2.86	2.81
Au	6.10	4.84	4.44	4.25	4.06	3.96	3.91

INITIAL VELOCITIES OF RECOIL ATOMS

$$u = \Lambda \times 10^7 \text{ cm sec}^{-1}$$

From	To	$\Lambda =$	From	To	$\Lambda =$
U_I	UX_I	2.39	An	Ac-A	3.36
U_{II}	Io	2.54	Ac-A	Ac-B	3.58
Io	Ra	2.62	Ac-C	Ac-C'	3.44
Ra	Rn	2.72	Ac-C'	Ac-D	3.61
Rn	Ra-A	2.96	Th	Ms-Th ₁	2.40
Ra-A	Ra-B	3.16	Rd-Th	Th-X	2.86
Ra-C	Ra-C''	2.99	Th-X	Tn	2.99
Ra-C''	Ra-D	3.66	Tn	Th-A	3.20
Po	Ra-G	3.08	Th-A	Th-B	3.39
Pa	Ac	2.74	Th-C	Th-C''	3.26
Rd-Ac	Ac-N	3.02	Th-C'	Th-D	3.97
Ac-N	An	3.01			

RANGES (PENETRATION) OF RECOIL ATOMS

Ra-A to Ra-B, 0.14 mm in air; 0.83 mm in H_2 ; ca. $20\mu\mu$ in Ag (52).

Rn to Ra-A—Ra-C, ca. $10\mu\mu$ in Cu and Ni (14, 40).

Th-C to Th-C', at 15° and 1 atm., 0.553 mm in H_2 ; 0.129 mm in air (24).

Th-C to Th-D, 15° 1 atm., 0.963 mm in H_2 ; 0.224 mm in air (24).

THE MCCOY NUMBER

The McCoy number is the ratio of the total α radiation to the uni-directional radiation per cm^2 from a U_3O_8 surface of α -saturated thickness. McCoy (27, 28) found 793 with $I_s = 1.74 \times 10^{-3}$ es per cm^2 U_3O_8 and St. Meyer and Paneth (34) found 790 with $I_s = 1.73 \times 10^{-3}$. These numbers are smaller than the theoretical.

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RADIOACTIVE RADIATIONS IN GASES

R. D. KLEEMAN

I. RANGE AND VELOCITY OF α -RAYS IN GASES AT 1 ATMOSPHERE

At 1° and 1 atm., $R_1 = R_0 \frac{T}{273.1}$

RANGE IN AIR AT 0° AND 1 ATM. (13)

From	U _r	U _n	Io	Ra	Rn	Ra-A
R ₀ , cms.	2 531	2 910	3 028	3 212	3 907	4 476
From	Ra-C'	Ra-C''*	Ra-C''*	Ra-F, Po	Pa	Rd-Ac
R ₀ , cms.	6 608	8 8	10.6	3 721	3 482	4 432

* Two new α -rays from Ra-C' by the scintillation method (24)

From	Ac-X	An	Ac-A	Ac-C'	Th	Rd-Th
R ₀ , cms	4 111	5 187	6 211	5 224	2 749	3 810
From	Th-X	Tn	Th-A	Th-C'	Th-C''	
R ₀ , cms	4 127	1 790	5 387	4 538	8 168	

MEASURED RANGES IN OTHER GASES

Gas	From Ra-C'				From Po			
	Air	O ₂	H ₂	He	Air	O ₂	H ₂	He
R ₀ , cms.	0 93 to 6 97	6.26	30.93	32.54	3 76 to 3 95	3 43	16 8	
Lit.	(12, 13, 17, 27)	(27)	(27)	(27)	(8, 13, 14, 16, 18, 19, 20, 21, 22, 23, 27)	(21)	(21)	(21)

Gas	From Po							
	He	N ₂	CH ₄	CO	CO ₂	NO	SO ₂	CH ₃ Br
R ₀ , cms.	17 62	3 82	4 18	3 70	2 40	3 41	2 08	1 80
Lit.	(27)	(21)	(21)	(21)	(21)	(21)	(21)	(21)

For range of recoil atoms, see p. 368

Distribution of Ranges.—This follows a probability law. Thus the most probable range for a Ra-F (=Po) α -ray is 3.85 cm at 15° and 1 atm.; 90% lie between 3.75 and 3.95, and 60% between 3.8 and 3.9 (8). For long range particles from Th-C', Ac-C', and Ra-F, v. (2). I. Curie (8.5) found for a very narrow beam for Po, the range $R_{10}^{100} = 3.87$ cm, as against the much greater value of H. Geiger, $R_{10}^{100} = 3.925$ cm.

Velocity of α -particles.—The velocity, u , of any α -ray may be computed from the relation $u^2 = aR$ where a is a constant and R the length of the remaining path (11). Taking $u = 1.922 \times 10^9$ cm sec⁻¹ (25) as the initial velocity of the α -particles from Ra-C', at 0° and 1 atmosphere in air, this becomes $u = 1.0246 \times 10^9 R^{1/2}$ where R is the range.

Example: R_0 for Th-C' in air is 8.168 cm (Table 1, *supra*). Hence $u = 1.0246 \times 10^9 \times \sqrt{8.168} = 2.064$ cm sec⁻¹, the initial velocity.

The following values of $u \times 10^{-9}$ at 0° and 1 atm. have been directly measured: Ra-A, 1.690 (25); Ra-C', 1.922 (25); Po, 1.593 (7); Th-C, 1.714 (30); Th-C', 2.060 (30). S. Rosenblum (22.5) determined directly the ratio of the initial velocities of the α -particles from Th-C—Th-C' = 1.209.

For velocity of recoil atoms see p. 368.

II. NATURE OF PATH

The path of an α -particle may undergo sudden bends (4, 26, 29). The table gives the number of bends (whose angles lie between the limits $\theta_1 - \theta_2$) for path-lengths (between bends) within the limits $l_1 - l_2$, for 281 Ra-F α -rays in air containing 75% A. The unit of l is $1/26$ cm. 0° and 1 atm. (3).

$\theta_1, \theta_2 =$	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°	90°-100°
l_1, l_2	3-7	11	20	22	8	13	7	6
	7-15	21	17	16	5	7		5
	15-30	12	8	7	2		5	
$\theta_1 - \theta_2 =$	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
	30-100	20	3	3				

The ionization along the path of a β particle varies inversely as the square of the velocity of the particle (28.5). The table gives the number, N_0 , of ions produced by a ray per first cm of path (13.5). $e = 4.774 \times 10^{-10}$ es.

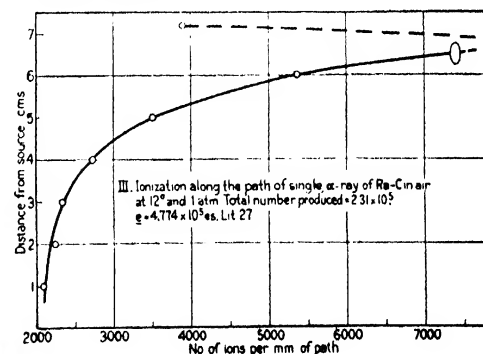
Source	Ac-C''	Th-C''	Ra-B	Ra-C	Ra-E	U
N_0	132	132	130	105	67	76

Coefficients of absorption, λ , of β rays in air and CO₂ at 1 atm. and 22° (18.5).

Substance	Ra-E	Ac-C''	Th-C''	U-X ₂
Air, λ in cm ⁻¹	0 0152	0 0091	0 0068	0 0065
Air, λ in (g/cm ²) ⁻¹	12 70	7 60	5 68	5 43
CO ₂ , λ in cm ⁻¹	0 0297	0 0175	0 0120	0 0114
CO ₂ , λ in (g/cm ²) ⁻¹	16 31	9 62	7 08	6 26

Substance	U-X ₂	Ra-D	Ra-D very soft	Th-B	Ac-B
Air, λ in cm ⁻¹	0 12	0 007	0 64	0 090	0 31
Air, λ in (g/cm ²) ⁻¹	100	81	535	75	260
CO ₂ , λ in cm ⁻¹	0 23	0 183	1 69	0 142	
CO ₂ , λ in (g/cm ²) ⁻¹	126	101	630	78	

Coefficient of absorption λ in cm⁻¹ of γ rays from Ra-C' in air at 1 atm. and 22° is 0.447×10^{-4} (17.4).



IV. STOPPING POWER OF GASES

$S = \frac{R_{000}}{R_{At}}$ for the same temperature and pressure (*).

1. Ionisation method (*). 2. Track-condensation method using Ra-F (**). 3. Scintillation method. α -rays of R_{11} 6.15 cm (†).

Gas	S	Method	Gas	S	Method
A	0.951 Ra-C'	1	CO	985 Ra-C'	1
	.934 Ra-A			976 Ra-A	
A	.930	3	CO	1.02 Ra-F	2
H ₂	.24	1	CO ₂	1.505 Ra-C'	1
H ₂	.22 Ra-F	2		1.488 Ra-A	
He	.201	1	CO ₂	1.52 Ra-F	2
He	.1757	3	CH ₄	0.860 Ra-C'	1
Kr	1.330	3		.880 Ra-A	
N ₂	.989 Ra-C'	1	CH ₄	.91 Ra-F	2
	.982 Ra-A		CCl ₄	4.00	1
N ₂	.99 Ra-F	2	CS ₂	2.18	1
Ne	.586	3	CHCl ₃	3.16	1
O ₂	1.064 Ra-C'	1	CH ₂ Br	2.03	1
	1.057 Ra-A		CH ₃ Br	2.04 Ra-F	2
O ₂	1.08 Ra-F	2	CH ₃ I	2.58	1
Xe	1.804	3	C ₂ H ₂	1.118 Ra-C'	1
Air	1.00	1		1.121 Ra-A	
H ₂ O	.77 Ra-F	2		1.122 Rn + Ra	
SO ₂	1.82 Ra-F	2	C ₂ H ₄	1.349 Ra-C'	1
N ₂ O	1.46	1		1.369 Ra-A	
N ₂ O	1.11 Ra-F	2		1.379 Rn	

Gas	S	Method	Gas	S	Method
C ₂ H ₅ Cl	1.405 Ra	1	C ₂ H ₅ O	2.00	1
	2.371 Ra-C'		C ₂ H ₅ O	3.437 Ra-C'	1
	2.385 Ra-A			3.471 Ra-A	
C ₂ H ₅ I	3.12	1	C ₂ H ₅	3.544 Ra-C'	1
C ₂ H ₄	1.514 Ra-C'	1		3.595 Ra-A	
	1.526 Ra-A		C ₂ H ₆	3.33	1

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ABSORPTION AND DIFFUSION OF β -RAYS IN LIQUIDS AND SOLIDS

PIERRE AUGER

Absorption Coefficients.—If I_0 be the initial intensity, and I_x the intensity after screen thickness x is traversed, $I_x = I_0 e^{-\mu x}$ where μ , the absorption coefficient, varies slightly with the thickness traversed. d = density.

ABSORPTION BY AL

Source	Ra-D	Th-A	Ra-E	Ac-C	Th-B	Ra-C
μ , cm ⁻¹	130	111.0	43.3	28.5	16.3	13.5
Lit.....	(12)					

Source	Ra-D very soft	Ra-B		Rb	Ra	U-X ₁	U-X ₂
		Soft	Hard				
μ , cm ⁻¹	5500	91	13	347	312	500	15
Lit.....	(13)	(6)	(10)	(9)	(5)	(5)	(5)

ABSORPTION OF β -RAYS FROM U-X (11)

Screen material	Ag	Al	C	Ca	Cd	Fe	Ir	Mg	Ni	Pb
μ/d , cm ² g ⁻¹	7.31	4.1	3.75	6.3	7.4	6.61	9.5	4.0	6.35	9.75
Screen material	Rh	S	Sb	Sn	Ta	Zn	NH ₄ Cl	CaSO ₄	SrSO ₄	
μ/d , cm ² g ⁻¹	7.0	4.52	7.74	7.6	8.9	6.4	5.2	4.95	6.50	

Screen material	BaCl ₂	BaSO ₄	NaCl	KF	KCl	KBr	KI
μ/d , cm ² g ⁻¹	8.07	7.7	4.68	4.8	4.88	6.1	7.8

ABSORPTION OF β -RAYS OF RA-E (7)

Screen	C	Al	Cu	Mo	Ag	Sn
μ/d	15.8	16.9	19.2	21.0	21.7	22.1

If N is the atomic number of the screening element, $\mu/d = 15 + 0.142 N$.

RANGE IN ALUMINUM OF β -RAYS OF VARIOUS VELOCITIES (LINEAR EXTRAPOLATION) (15)

RH	1380	1930	2535	3170	3790	4400
Range in cm	0.018	0.064	0.124	0.189	0.279	0.360
RH	5026	6230	7490	8590	11370	
Range in cm	0.440	0.580	0.785	0.925	1.36	

Velocity Decrease.— R = Radius of curvature of the β -ray in a magnetic field of N units and field force H gauss. ΔRH is the change in RH due to a screen of 0.01 g cm⁻² and is proportional to the velocity. According to Bohr, $\frac{\Delta RH}{c^2} u^3 = \text{a constant}$, K . u = the velocity of the particle, and c that of light (14).

DECREASE OF VELOCITY FOR β -RAYS FROM RA-B AND RA-C

RH	ΔRH	K	ΔRH	K	ΔRH	K
No screen	Mica screen	Sn screen		Au screen		
1392	138.1	34.8	89.2	22.8		
1660	101.4	34.7	67.4	23.4		
1925	78	33.1	56.8	24.1		
2235	72.6	36.2				
2960	66.7	43.5				
3260	59.2	41				
4840	47.3	39.9	37.6	31.7	32.2	27.3
5255	49.3	42.2	37.8	32.5		
5880	43.1	38	32.2	28.6	32.6	29
6160	41	36.7				
7060	38.4	35.4	30.2	27.8		

Dispersion of β -rays (2, 3, 8).

RADIOACTIVITY

LITERATURE

(For a key to the periodicals see end of volume)

- (1) von Boyer, 63, 23: 485; 12. (2) Bothe, 66, 6: 368; 23. (3) Crowther and Schonland, 5, 160: 526; 22. (4) Danyus, 51, 3: 949; 13. (5) Fajans and Gohring, 55, 14: 877; 13. (6) Fajans and Makower, 3, 23: 292; 12

- (7) Fournier, 54, 100: 284; 25. (8) Geiger and Bothe, 26, 6: 305; 21. (9) Hahn and Meitner, 63, 10: 741; 09. (10) Hahn and Rothenback, 63, 20: 197; 19. (11) Jungnickel, 63, 14: 507; 13. (12) Kovarik, 5, 20: 849; 10. (13) Meitner, 63, 16: 272; 13. (14) Rawlinson, 3, 20: 627; 15. (15) Varder, 5, 29: 725; 15. (16) Wilson, 5, 26: 141; 10.

WAVE LENGTHS OF γ -RAYS

E. VON SCHWEIDLER

GENERAL RELATIONS

A wave length of λ milli-Ångströms ($10^{-3} \text{ Å} = 10^{-11} \text{ cm} = 1 \text{ X-unit}$), corresponds to:

$$\text{A Frequency } (\nu) = 2.9086 \times 10^{11} / \lambda \text{ sec}^{-1}$$

$$\text{An Energy } (E = h\nu) = 1.9653 \times 10^{-8} / \lambda \text{ ergs}$$

$$\text{A Potential } (P = \frac{h\nu}{e}) = 1.2344 \times 10^3 / \lambda \text{ volts}$$

The equivalent electron velocity as a fraction of the velocity of light,

$$\beta = \frac{v}{c} = \frac{1}{\sqrt{1 + \frac{24.288}{\lambda^2}}}$$

$$h\nu = \frac{hc}{\lambda} = E = Pc = c^2 m_0 \left[\frac{1}{\sqrt{1 - \beta^2}} - 1 \right]$$

See p. 17 for values of basic constants.

WAVE LENGTHS DETERMINED WITH CRYSTAL GRATINGS

φ = angle of reflexion, d = grating space = 2.814 Å for rock salt = 3.028 Å for calcite. $\lambda = 2d \sin \varphi$. Intensity indicated thus, s = small, m = moderate, g = great, vg = very great.

(a) Soft Radiations from Ra-B. Using rock salt (2, 3). Corresponding to L-series of elements of atomic Nos. 82 and 83, according to Swinne (5) and Wagner (6).

λ , in 10^{-3} Å	1365 m	1349 m	1315 s	1286 s	1266 s	1210 s	1106 m
φ , deg. min.	14° 00'	13° 52'	13° 31'	13° 14'	13° 00'	12° 31'	12° 10'
λ , in 10^{-3} Å	1175 g	1141 m	1100 s	1074 s	1055 s	1029 m	1006 m
φ , deg. min.	12° 03'	11° 42'	11° 17'	11° 00'	10° 48'	10° 32'	10° 18'
λ , in 10^{-3} Å	982 g	953 m	917 s	853 m	838 m	809 m	793 m
φ , deg. min.	10° 03'	9° 45'	9° 23'	8° 43'	8° 34'	8° 16'	8° 06'

(b) Hard Radiations from Ra-B + Ra-C, Sec. 1. Radiations from Ra-Th and its products, Sec. 2.

λ , in 10^{-3} Å	428	(393)	(324)	296	262	242	229	196
φ , deg. min	4° 22'	4° 00'	3° 18'	3° 00'	2° 40'	2° 28'	2° 20'	2° 00'
Remarks	1. Using rock salt (4)	Probably 2nd order spectrum to 196 and 159			K-series			

λ , in 10^{-3} Å	169 g	159 g	137	116	99 g	71	72	66
φ , in deg. min	1° 43'	1° 37'	1° 24'	1° 11'	1° 06'	43'	41'	37.5'
Remarks	K-line					Using calcite (16)		
	Ra-C? Ra-B?							

λ , in 10^{-3} Å	58	48	37	28	168 g	145 g	62 s	52 m
φ , deg. min	33'	27.5'	21'	16'				
Remarks	Using calcite (16)				to Ra-Th		to Th-B	

2. Ms-Th (28)				
---------------	--	--	--	--

WAVE LENGTHS CALCULATED FROM THE ENERGY OF β -RAYS

Primary γ -rays of energy E_γ produce in the disintegrating atom itself, or in other atoms, secondary β -rays of energy $E_\beta = E_\gamma - A$, where A is the work of removal and depends upon the level from

which the β -rays originate. Sometimes it is assumed that the β -rays are primary and produce secondary γ -rays of energy $E_\gamma = E_\beta$. The energy of the β -rays is obtained from their magnetic deflections.

λ , in 10^{-3} \AA		66		230	174	155	51.9	51.3 m
Lat		Ra (14, 28)		Ra-B (26)	(26)	(26)	(22)	(20, 20)
λ , in 10^{-3} \AA	48 0 s	42 6	42 0 m	35.6	35.2 g	$\text{Ra} + \text{Ra-C}$		209?
Lat	(28)	(22)	(26)	(22)	(26)		(22)	(26)
λ , in 10^{-3} \AA	49.8?	44.4?	28 9?	45.4	37.5	32.0	30.2	29.0
Lat	(28)	(28)	(26)	(16)	(16)	(16)	(22)	(22)
λ , in 10^{-3} \AA	24.9	24 3	21 2	20.6	20.4	20.3	16.27	10.93 g
Lat	(16)	(28)	(28)	(22)	(28)	(28)	(28)	(28)
λ , in 10^{-3} \AA	10.0 s	9 93 g	7 00 s	6.94 g	5.56? g			269
Lat	(28)	(28)	(28)	(28)	(28)		Ra-D	(12)
λ , in 10^{-3} \AA		171	59.7	53 0	37 1	37.0	29.7	26.9 g
Lat		Ms-Th (28)	(28)	(28)	(28)	(28)	(28)	(28)
λ , in 10^{-3} \AA		147	52 9 g	52	41.6	41.3 s	45.2 s	
Lat		Rd-Th (12)	Th-B (28)	(12)	(16)	(28)		Th-C (28)
λ , in 10^{-3} \AA	24 5	21 3	13.6 g	13.5 g	12.8 m	$\text{Th-B} + \text{Th-C}$		4.84
Lat	(16)	(28)	(28)	(28)	(28)		(24)	4.71 (26)

EFFECTIVE WAVE LENGTHS CALCULATED FROM ABSORPTION AND SCATTERING

The ordinary or "apparent" absorption coefficient, $\mu' = \mu + \sigma$, where μ is the "true" or "fluorescent" absorption coefficient, and σ the coefficient of scattering. For dependence on wave length σ . (Glocker (8); Compton (12); Wingårdh (23); Warburton and Richtmyer (24); Jauncey (25); and Allen (30)).

γ -RAYS FROM RA-C

λ_{eff} , in 10^{-3} \AA	<63	<60	120-60	80-30
Calc. from	Abs.	Abs.	Scat.	Abs.
Lit.	(7)	(9)	(12a)	(10b)

λ_{eff} , in 10^{-3} \AA	30-25	21	24	8	19	19.5
Calc. from	Scat.	Abs.	Abs.	Scat.	Scat.	Scat.
Lit	(12b)	(31)	(23)		(22a, 22b)	

LITERATURE

(For a key to the periodicals see end of volume)

- (1) Shaw, 5, 26: 190; 13. (2) Rutherford and Andrade, 55, 92: 267; 13. (3) Rutherford and Andrade, 5, 27: 854; 14. (4) Rutherford and Andrade,

5, 26; 263; 14. (4) Swinnee, 65, 17: 481; 16. (5) Wagner, 65, 18: 405; 432, 461, 468; 17. (7) Rutherford, 5, 24: 153; 17. (8) Gloecker, 65, 19: 66; 18 249, 26; 421; 19. (9) Kohlrausch, 65, 19: 345; 18.

(10a) Trestel, *Disa Heidelberg*, 20. (10b) Prelinger, 75, 130: 279; 21. (11) Ellis, 5, 99: 261; 21. (12) Compton, 5, 18: 296; 19. 5, 41: 749; 770, 21. (13) Meitner, 90, 9: 131, 145; 22. (14) Meitner, 218, 10: 381; 22. (15) Smekal, 90, 10: 275; 22. (16) Ellis, 5, 101: 1, 22. 201, 21: 121; 22. 90, 10: 303; 22. (17) Meitner, 90, 11: 35; 22. (18) Kovarik, 2, 19: 433; 22. (19) Madgwick, 248, 6: 136, 21.

(20) Meitner, 90, 17: 54; 23. (21) Hahn and Meitner, 90, 17: 157, 23. (22)

de Broglie and Cabrera, 54, 174: 939; 22. 54, 176: 295; 23. (23) Wingårdh, 90, 20: 315; 23. (24) Warburton and Richtmyer, 2, 22: 539; 23. 2, 23: 291; 24. (25) Jauncey, 2, 22: 233; 23. (26) Ellis and Skinner, 5, 100: 60, 165, 185; 24. (27) Smekal, 90, 26: 265; 24. (28a) Hahn and Meitner, 90, 26: 161; 24. (28b) Meitner, 90, 26: 169; 24. (29) Thibaud, 54, 178: 1708; 24. 54, 179: 165, 815, 1052, 1322; 24. 54, 180: 138; 25. 250, 209: 8; 24.

(30) Allen, 2, 23: 291; 24. (31) Owen, Fleming and Page, 67, 26: 355; 24. (32a) Ahmad, 5, 105: 507; 24. (32b) Ahmad and Stoner, 5, 106: 8; 24. (33) Gray, 58, 116: 13, 86; 25. (34) Black, 58, 116: 226; 25.

RADIOACTIVE RADIATIONS FROM ORDINARY METALS

R. B. MOORE

1. POTASSIUM AND RUBIDIUM

β -rays only are emitted spontaneously, the emission being an atomic property independent of the temperature

ACTIVITY OF K IN ARBITRARY UNITS (4)

Salt	K ₂ SO ₄	KI	KBr	KCl	KF	KClO ₄	KNO ₃
%K...	44 91	23 58	32 87	52 18	67 32	28 91	28 69
Activity...	37 8	21	27 8	42 2	54 0	25 5	30 6
K/Act	118	112	118	124	123	110	126

ABSORPTION OF THE β -RADIATION (6)

λ = absorption coefficient cm^{-1} , d = density of absorbent

λ/d for β -rays from K	λ/d for β -rays from Rb
By K ₂ SO ₄	11 32 By Rb ₂ SO ₄
By Sn (90% of the rays)	14 By paper (90% of the rays) ...
By Sn (10% of the rays)	90 By paper (10% of the rays) ...
	162
	950

ABSORPTION OF β -RAYS FROM Rb BY PAPER (5)

W = wt. paper/ cm^2 . I_0 intensity of the initial radiation; I_p that of the emergent radiation.

W	0.0	0.0153	0.00305	0.00458	0.00761	0.0107	0.0153	0.0198
I_p/I_0	1.0	0.725	0.515	0.422	0.260	0.159	0.087	0.031

2. CAESIUM, SODIUM, LEAD, IRON AND ZINC

Cs and Na are not radioactive (8, 9, 10). Ordinary Pb shows a slight, very old Pb only a trace of activity. On account of their exceptionally small activity Fe and Zn are recommended for

construction of sensitive instruments for radioactive measurements. Ca, Ba, Sr, C, Cl, Br, Cu, Fe, Pb, Mg, Mn, Ni, Ag, Zn, W, Ta, La, Se, As, Sn, Au, Sb, Al and Hg are inactive (10).

3. NOTES

O Hahn and M. Rothenbach (3) compared Rb salts of various ages but no difference in activity was detected. The Rb rays were found to be more penetrating than the β -rays of UX₁, but not so penetrating as those of Ra. The ratio of the intensity of the Rb rays to those of UX₁ is 1:15. The half-life of rubidium is calculated to be 10^{11} years and that of potassium 3 to 7 times greater. The absorption coefficient in Al of K is from 39.0 to 55.4 as foil thickness increases from 0.0135 to 0.0405 cm. Rb decreases from 593 to 522 as foil increases from 0.0017 to 0.0051 cm.

According to Bergwitz (1) the velocity of the Rb rays is $1.85 \times 10^{10} \text{ cm} \cdot \text{sec}^{-1}$

Ringer (7) states that pure K and Rb give off homogeneous β -rays, the K rays having 10 times the penetrating power of the Rb rays. Harkins and Guy (10) give this figure as from 10 to 15 and state that the radiation from Rb is slightly heterogeneous.

Geiger (2) found that the saturation current from RbCl is the same at room temperature and at liquid-air temperatures.

LITERATURE

(For a key to the periodicals see end of volume)

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DISTRIBUTION OF RADIOACTIVE MATERIALS IN THE ATMOSPHERE, THE HYDROSPHERE AND THE LITHOSPHERE

HERMAN SCHLUNDT

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RADON IN THE ATMOSPHERE

Method A: Rn absorbed in charcoal.
Method B: Rn condensed with liquid air.
Method C: Rn directly determined in large ionization chamber.
Method D: Rn computed from active deposit on negatively charged wire.

Place	Micro-micro Curies (10^{-12} Curies) Rn per cubic meter	Method	Number of determinations	Lit.
Montreal, Can	24-127, Mean, 80	A		(21)
Montreal, Can	Mean, 60	A	50 during 1907-8	(22)
Cambridge, Eng.	35-350, Mean, 105	A	60 during 6 mos	(23)

Place	Micro-micro Curies (10 ⁻¹² Curies) Rn per cubic meter	Meth- od	Number of determina- tions	Lit.	Source	t°C	mμCl ⁻¹		Ra, μg ⁻¹	Lit.
							Water	Gas		
Chicago, U. S. A.	45-200, Mean, 100	B	6	(1)	British Columbia					
Manila, P. I.	71	A	30 during 1 year	(136)	Farmont Springs . . .		3.5		100	(11)
Freiburg, Switzerland	54-305, Mean, 131	A or B		(78)	Sinclair		4.0		tr.	(11)
Innsbrück, Austria . . .	40-1110, Mean, 433	C	40	(137)	UNITED STATES					
Seeham, Austria	188	C		(116)	Arlington, R. I.		8.78			(79)
Tokyo, Japan	5	D		(49)	Graphite Mine Spr					
Pacific Ocean.	1.3	D	Mean of 169, 1915-21	(66)	Williamstown, Mass.	22	0.22	7.3		(118)
Atlantic Ocean	1.7		Mean of 79	(66)	Wampanoag		0.04			(118)
Indian Ocean	1.3		Mean of 37	(66)	Sherman Spring					
Southern Ocean S. of lat. 50°	0.3		Mean of 48	(66)	Saratoga Spr., N. Y.					
All accessible ocean areas.	1.2		Mean of 333	(66)	Emperor	10	0.07	0.221	08	(71)
High seas	2.6		Mean of ca. 400*	(66)	Hathorn No. 1 . . .	10	0.142	0.213	42	(71)
					Geyser	10	0.039	0.034		(71)
					Pump Well No. 4 . .	12	0.231	0.078	21	(71)
					Crystal Rock	10	0.88	0.847	9	(71)
					Indiana					
					Mean of 27 sprs	cold	0.75			(89)
					French Lick					
					Pluto Spring	13	0.54			(8)
					Bowles Spring	10	1.78			(8)
					Illinois					
					Dixon Spr. No. 2 . .		2.93			(118)
					Creul Spr. No. 3 . .		0.84			(118)
					Well, Joliet		0.39			(118)
					Mt. Vernon Spring		0.18			(118)
					Yellowstone Nat. Pk					
					Mammoth Hot Spr.,					
					Hot River	51	1.44		2.5*	(104)
					Main Spring	71	none	none	3.8*	(104)
					Apollinaris Spr	9	1.08			(104)
					Nymph Spring, Tower Falls		0.23	6.5		(104)
					Upper Geyser Basin, Bench Spring	86	0.22	124		(104)
					Fish Cone, West Thumb			41.8		(104)
					Lower Geyser Basin, Firehole Lake	85	0.28	204		(104)
					Missouri					
					Sweet Springs		0.81			(103)
					Rollins Springs, Columbia		0.15			(103)
					Hot Springs, Ark.					
					Imperial Spring . . .	61	9.03			(9)
					Palace Spring	61	0.12			(9)
					Avenue Spring	62	0.80			(9)
					Twin Spring	62	2.22			(9)
					Arsenic Spring	54	0.49			(9)
					Horseshoe Spring . . .	60	0.18			(9)
					Laver Spring	8	0.59			(9)
					Kidney Spring	13	3.03			(9)
					Madison, Wisconsin					
					Merrill Springs		0.49			(101)
					Manitou, Colo.					
					Shoshone Spring . . .	15	3.38	12.7		(102)
					Manitou Soda	15	1.25			(102)
					Manitou Soda	15	0.268	1.02		(84)
					Shoshone		1.66	15.52		(84)
					Iron Soda Spring	15	0.24	1.15		(84)
					Iron Soda Spring	15	1.53	1.07		(102)
					Navajo Spring		1.37	3.4		(102)
					Navajo Spring	22	1.21	3.3		(84)
					Steamboat Springs, Colo.					
					Soda	15	0.18	1.42		(102)
					Soda	15	1.36	6.03		(84)

* Ra in 10⁻¹² g per g of residue.RADIOACTIVITY OF SPRING AND WELL WATERS AND
SPRING GASESmμCl⁻¹ = Millimicrocuries (10⁻⁹ Curies) per liter
Ra, μg⁻¹ = Dissolved radium, micro-micro-graus (10⁻¹² g) per
liter

NORTH AMERICA

Source	t°C	mμCl ⁻¹		Ra, μg/l.	Lit.
		Water	Gas		
CANADA					
Quebec					
Maskinonge	8	0.079	0.250	0.5	(99)
Radnor Forges	10	0.345		0.3	(99)
St. Benoit.	11	0.028		0.0	(99)
St. Leon (Lupien)	8	0.148	0.46	0.8	(99)
St. Hyacinthe (Philudor).	8	0.106		46	(99)
St. Severe.....	8	0.087		2.8	(99)
Varennas.....	9	0.224	0.81	9.2	(99)
Ontario					
Borthwick, near Ottawa	11	0.140		8.4	(99)
Sulfur Spring, Caledonia Spr.	8	0.073		5.6	(99)
				15.0	(23)
Duncan Spring, Caledonia Spr.	9	0.053	0.204	5.6	(99)
Duncan Spring, Caledonia Spr.	9		0.42	18.0	(23)
Gas Spring, Caledonia Spr	8	0.090	0.306	8.4	(99)
Gas Spring, Caledonia Spr	8		0.62	15	(23)
White Sulfur Spring, Cars- bad	9	0.09		0.8	(99)
Magic Spring	9	0.087		25	(99)
Soda Spring	9	0.081	0.23	1.1	(99)
Russell Lithia, Bourget..	10	0.056		5.9	(99)
Alberta (Banff)					
Upper Hot Spring. . . .	46	0.221		8.6	(99)
Kidney Spring... . .	39	0.392		8.5	(99)
Cave Spring.	30	0.470	3.34	8.5	(99)
Basin Spring.	35	0.232	2.37	8.5	(99)
Auto Road Spring.....	19	0.640		23.5	(99)

Source	t°C	m μ Cl ⁻¹		Ra, μ g l ⁻¹	Lit.
		Water	Gas		
UNITED STATES.—(Cont'd)					
Steamboat Springs, Colo.— (Cont'd)					
Bath House.....	40	0.08	0.54		(102)
Bath House.....	40		0.79		(54)
Iron.....	24	0.99	3.71		(102)
Iron.....	24	0.91	3.50		(54)
Craddock, Glenwood Springs, Colo.....		2.21			(54)
Virginia					
Mean of 11 springs.....		0.21			(120)
Ohio					
Mean of 9 springs.....	cold	0.34			(59)
Bloomington, Ind.					
Hottle Spring*.....		0.806			(90)

* Mean of 37 tests during 9 months.

EUROPE

Source	t°C	m μ Cl ⁻¹		Lit.
		Gas	Water	
AUSTRIA				
Tauern Tunnel.....		3.81*		(52)
Böckstein Valley.....		3.20†		(52)
Near Vienna				
Johannesbad.....	30	1.86	0.8	(53)
Haupt Quelle, Vöslau.....	23	0.29	1.07	(53)
Tyrol				
Magenquelle, Froy.....	6	17.6		(2)
Eisenquelle, Froy.....	8	4.5		(2)
Badequelle, Steinhof.....	9	0.8		(2)
Herrenbadquelle, Fischau.....	19	0.23	0.80	(53)
Gastein				
Grabenbäckerquelle.....	36	55.5		(50, 51)
Elisabethstollen, Hauptquelle.....	47	53.3		(51)
Nordquelle.....	44	9.0		(51)
Rudolfstollen.....	47	21.3		(51)
Franz Josephstollen.....	41	34.6		(50, 51)
Reissacherstollen.....	36	84		(51)
Teichquelle, Tanbach.....		21.3		(51)
Melaniequelle, Radegund.....		5.3		(132)
Annenquelle, Mariatrost.....		0.36		(132)
Johannesbrunnen, Semmering.....	5	1.27		(3)

* Mean of 101 springs; highest 23.7.

† Mean of 3 springs.

Source	m μ C ⁻¹		Lit.
	Gas	Water	
BELGIUM			
Deloor Spa.....	1.45		(34)
Marie-Henriette Spa.....	1.45		(34)
Prince de Conde I. Spa.....	1.44	1.74	(34)
Tounelet, Spa.....	1.67	2.58	(34)
La Fraineuse Spa.....	2.43		(34)
Claire-Fagne Spa.....	2.1		(34)
Salmon E. superieure Spa.....	3.31		(34)

Source	t°C	mμCl ⁻¹	
		Water	Gas
CZECHO-SLOVAKIA (20, 51, 53, 132)			
Loimannsquelle, Fransenbad.....	11	0.39	0.27
Salsquelle, Fransenbad.....	11	0.05	
Mine water, St. Joachimsthal 60 m depth.....	6	13.5	
375 m depth.....	14	75.9	
500 m depth.....		163.8	448.0

Source	t°C	m μ Cl ⁻¹		Lit.
		Water	Gas	
Bernhardsbrunnen, Karlsbad.....	61	0.65	1.14	
Mühlbrunnen, Karlsbad.....	39	12.9	38.6	
Schlossbrunnen, Karlsbad.....	30	7.1	20.6	
		3.61		
Hospitalquelle, Karlsbad.....	12	0.96		
Sprudel,* Karlsbad.....	71	0.16	0.36	
Eisenquelle, Karlsbad.....	8	15.7		
		19.5		
Ferdinandsbrunnen, Marienbad.....	10	0.27		
Kreuzbrunnen, Marienbad.....	8	1.75	3.56	
Marienquelle, Marienbad.....		0.71		
Waldquelle, Marienbad.....	7	1.87	4.47	
Augenquelle, Teplitz Schönau.....	22	1.28		
Riesenquelle, Dux.....		3.58		
Urquelle, Dux.....	46	2.03	9.0	

* 55 × 10⁻¹³ Ra per liter

Source	m μ Cl ⁻¹		Lit.
	Water	Gas	
ENGLAND			
Nine Wells, Cambridge.....	0.130	33.65	(94)
Well, Dale's Brewery, Cambridge ..	0.196		(94)
King's Well, Bath.....	1.73		(88)
Cross Spring, Bath.....	1.19		(88)
Hetling Spring, Bath.....	1.70		(88)
Hospital Natural Baths, Buxton.....	0.83	7.70	(64)
Gentlemen's Natural Baths, Buxton.....	1.10		(64)

Source	t°C	m μ Cl ⁻¹		Lit.
		Gas	Water	
FRANCE				
Choussy, La Bourboule.		22.9	141.5	(52)
Choussy, La Bourboule.		20.5	161.4	(53)
de la Grange, Beaucens.		3.03	10.36	(52)
Chaude, Audinac.		0.14	0.59	(52)
Rivière, Chaudeau.		6.51	39.5	(12)
Dames, Plombières.		10.76		(12)
Lambinet, Plombières.		15.96		(12)
Savonneuse, No. 2, Plombières.		7.47	35.1	(12)
Vauquelin, Plombières.		4.83	86.4	(12)
Chaudes-Fontaines, Rehery.		4.1	19.8	(12)
Celestins, Vichy.	44	0.653	4.1	(52)
Chomel, Vichy.	44	0.653	4.1	(52)
Boussange, Vichy.	42	0.103	0.60	(52)
Hôpital, Vichy.	34	0.022	0.14	(52)
Condanny, Usson.		0.563	34.5	(55)
Plaies, Usson.		0.663	1.9	(55)
d'Alun, Aix-les-Bains.		4.1	25.8	(16)
Le Lymbe, Bourbon-Lancy.		1.5	14.6	(16)
Pavillon, Coutreville.		0.51		(16)
Bordeu (Grande Source), Luchon.	43	16.1	134.8	(73)
Main Spring (Saline and H ₂ S), Uri- age-les-Bains.		0.113		(8)
Gasseng, Columbières-sur Orb.			6.69	(15)
Cabanel, Columbières-sur Orb.			2.22	(15)
Crémieu, Columbières-sur Orb.			1.49	(12)
Viguerie, Ax.			16.8	(72)
Savonneuse, Bains-les-Bains.			25.6	(72)
Vielle, Eaux-Bonnes.			3.7	(72)
La Chaldette.			93.7	(73)
Romaine, Maizières.			10.8	(72)
Souveraine, Vals-les-Bains.		1.047	5.06	(5)
Dominique, Vals-les-Bains.		8.80		(5)

Source	°C	m μ Cl ⁻¹		Lit.
		Gas	Water	
Caroline, Mont-Doré.....		0.34	2 49	(57)
Lepape, Bagnères-de-Luchon.....		41.5		(53)
Providence, Vernet-les-Bains.....	38	15.7	115.9	(53)
Santé, Vernet-les-Bains.....	37	2.7		(53)
Pastural, Les Escalades.....	27	3.5		(53)
Bassin Carré, Thuès-les-Bains.....	74	1.04	17.7	(53)
Saint-Victor, Royat.....	21	15.35	35.2	(53)
Hamel, Sail-les-Bains.....	34	11.5	50.2	(53)
Rouge, Saint-Nectair.....	21	0.54	2.2	(53)
Grande Source, Bagnols-de-l'Orne.....		0.74		(56)
Chaude fontaine, Antoigny.....		3.86		(56)
Saint-Ursin, Lignières.....		1.57		(56)
Fontaine Minérale, St. Michel.....		0.44		(56)

Source	°C	m μ Cl ⁻¹	Lit.
GERMANY			
Schwarzwald Region			
Antoniusquelle, Antogast.....	cold	6.6	(20)
Büttquelle, Baden-Baden.....	24	51.3	(20)
Murquelle, Baden-Baden.....	59	9.8	(20)
Kirchenquelle, Baden-Baden.....	56	1.35	(20)
Hauptquelle, Badweiler.....	28	3.1	(20)
Gemeindequelle, Badweiler.....	23	4.2	(20)
Badquelle, Griesbach.....	cold	10.6	(20)
Sofienquelle, Petersthal.....	cold	1.76	(33)
Wenzelquelle, Rippoldsau.....	cold	0.86	(33)
Warme Quelle, Wildbad.....	36	1.35	(20)
Kalte Quelle, Wildbad.....	cold	0.08	(20)
Well, Heidelberg.....	27	2.15*	(7)
Württemberg			
Göppinger, Sauerbrunnen.....		1.27	(50)
Göppinger, Staufbrunnen.....		0.57	(50)
Kursaal, Kanstatt.....		0.22	(50)
Karlsquelle, Mergentheim.....		0.98	(50)
Hirschquelle, Feinach.....		0.42	(50)
Wildbad.....		0.76	(50)
Hessen and Adjoining Regions			
Sprudel XII, Bad Nauheim.....	33	5.8†	(105)
Karlsbrunnen, Bad Nauheim.....	15	9.6†	(105)
Bad Homburg, Elizabethbrunnen.....	11	1.46†	(105)
Luisenbrunnen.....	11	0.84†	(105)
Wilhelmsbrunnen, Bad Soden.....	14	6.02†	(105)
Solbrunnen, Bad Soden.....	16	1.56†	(105)
Inselquelle, Kreuznach.....	13	7.42†	(105)
Theodorshalle, Kreuznach.....	7	3.06†	(105)
Hauptbrunnen, Münster am Stein.....	31	8.5†	(105)
Kochbrunnen, Wiesbaden.....	68	0.43†	(39)
Adlerquelle, Wiesbaden.....	64	2.23†	(39)
Schützenhofquelle, Wiesbaden.....	50	0.29†	(39)
Racoczy, Kissingen.....		1.04†	(41)
Maxquelle, Kissingen.....		1.58†	(41)
Maxquelle, Dürkheim a.d. Haardt.....	20	0.69	(7)

* 1620 $\times 10^{-12}$ g Ra per liter of water.† Values obtained by multiplying Maché units by 3.64×10^{-10} ‡ Values obtained by multiplying Maché units by 4.1×10^{-10}

Source	m μ Cl ⁻¹	No. of samples	Lit.
Bavaria			
Alexanderbad.....	7.73	2 spr., 6 wells, 1 reservoir	(28)
Ebermannstadt and env.....	0.43	18 spr., 2 w.	(28)

Source	m μ Cl ⁻¹	No. of samples	Lit.
Saxony			
Epprechstein and env.....	1.17	2 spr., 7 w., 2 reservoirs	(20)
Fichtelgebirge, Neubau.....	1.55	5 spr., 8 w.	(20)
Leinleithal.....	0.36	21 spr., 5 w.	(20)
Leupoldsdorf and env.....	25.0	6 spr., 2 w., 5 reservoirs	(20)
Schwarzenfeld and env.....	0.64	3 spr., 6 w.	(20)
Weisenthau.....	1.32	15 spr., 6 w.	(20)
Wolsenberg and env.....	4.87	17 springs	(20)
Wundsiedel and env.....	7.7	13 spr., 6 w., 1 reservoir	(20)
Wettingquelle, Brambach.....	826.2		(21)
Trinkquelle, Oberschlema.....	650 to 754		(20)
Marx-Semler Stollen, Ober- schlema.....	688 to 920		(20)
Himmelfahrtstollen, Georgen- thal.....	288 to 330 at 10°C		(27)
Olga-Brunnen, Schneeberg.....	24.1		(27)
Rockelmann-Quelle, Schwar- zenberg.....	13.1		(27)
	12.3		(27)

Source	t°C	m μ Cl ⁻¹		Lit.
		Water	Gas	
HUNGARY				
Budapest				
Rakocsy, St. Lucasbad	42	7.40	9.08	(124)
Composite, 17 spr. Lucasbad		3.35		(126)
Trinkquelle, Kaiserbad	60	0.31		(124)
Grosse Quelle, Ritzenbad	43	3.16		(124)
Kerekmalom Quelle	20	0.11		(22)
Arpadquelle	23	0.046	0.624	(22)

Source	°C	m μ Cl ⁻¹	Lit.
ITALY			
Sorgente Montirone, Abano near Padua.....	87	2.05*	(20)
Upper Sulfur Therm, Aqui Piedmont.....	72	0.28*	(20)
Fiuggi, Anticoli.....		8.02*	(20)
Surgonne Grotta, Battaglia near Padua.....	74	3.34*	(20)
Acidola, Castellamare.....	13	9.27*	(20)
Domenico Tricarico, Bagnoli near Naples.....	52	0.79*	(20)
Purgativo, Agnano near Naples.....	90	0.79*	(20)
Stabilimento, Porto d'Ischia.....	65	1.93*	(20)
Manzi I, Cassamicciola, Ischia.....	85	0.57	(20)
Old Roman Spring, Lacco Ameno, Ischia.....	57	152.5*	(20)
Fonte di Castello, Santa Fiora.....	12	3.01	(77)
Fonte della Casella, Casteldel piano.....	12	1.85	(77)
Acqua dei Bagnoli, Acidoso.....	14	3.29	(77)
Polla di Sotto, Bagnore.....	20	1.52	(77)
Sambuco, Montagna.....	8	2.08	(77)
Baleno Carraiole, Oliveto.....		1.09	(78)
		Gas = 8.6	
Pozzo delle Saline, Salsomaggiore.....		4.41	(76)
Bagni di Casciana.....		0.0	(77)
		Gas = 1.8	
Parlanti, Monsummano.....	31	0.064	(22)

* Values obtained by multiplying Maché units by 4.1×10^{-10} .

Source	t°C	mμCl ⁻¹ Water
NORWAY (88)		
Nasodden		17.9
Sandevar		12.9
Jellum, near Modum		31.2
Tandberg estate, Simoa Valley		67.4
PORTUGAL (81)		
Sabroso, Sabroso (Vidago)		3.29
Fonte Romana, Fonte Romana		2.05
Da Bica, Ferez		8.20
Das Lamas, Cucos		10.4
RUMANIA (58)		
Orsova		
Hercules, Baile Herculan	46	0.19*
Regina Maria, Baile Herculan	60	0.22
RUSSIA (68)		
Essentuki No. 6, Caucasus		3.5
Batalinsky, Caucasus		0.6
SPAIN (15)		
Rivas, Gerona		0.33
Buitre, Seirra de Fuensante, Murcia		0.05
Garganton y Pianolon, Sierra de Guadarrama		12.5
La Raja, Mazarron, Murcia		0.46
El Tubo, Mazarron, Murcia		0.48
Posa de Levante, Mazarron, Murcia		0.36
Medica Catlan, Mazarron, Murcia		0.68
SWEDEN (91, 119)		
Slottskallan, Upsala	7	1.8
Bourbrum, Upsala	6	1.55
Birjerjarlag No. 120, Stockholm	6	14.6
Gamla (spring), Porla	7	1.77
Sofia (spring), Helsingborg	10	3.00
Villastaden (drilled well), Lidington	8	17.06
Norrh, L. (well), Bodens fastning	5	70.6
Stockh. l. (well), Vinterviken	10	67.2
Hermelinsgruf (well), Malmberget	3	2.75
Kalmar, l. (spring), Sodra Vi	6	14.1
Sanatorie parken (spring), Mossberg	7	0.90

* Emanation content changes with season and even on same day.

Rock formation of source	No. samples	mμCl ⁻¹ Water
SWEDEN.—(Continued)		
Boulders, morainal deposits	110	2.40
Diabase	10	0.70
Granite (Archean)	53	13.24
Granite (gneissic)	20	5.66
Granulite	14	10.2
Gray gneiss with granite intrusives	6	6.11
Gneiss (granitic)	20	2.99
Iron-bearing gneiss	12	9.31
Limestone	42	0.78
Peat	16	1.18
Quartz porphyry	5	2.09
Sandstone	37	2.91
Slate	42	1.11
Syenite and granulitic syenite	15	15.46

Source	t°C	mμCl ⁻¹ Water	Lit.
SWITZERLAND			
St. Placidus Spring, Disentis		4.66	(127)
Val Lunpegnia, Disentis	8	3.75	(117)

Source	t°C	mμCl ⁻¹ Water	Lit.
Leuk	51	0.12	(127)
Waadt, Lavey		4.51	(117)
Paracelsusquelle, Engadine, St. Moritz	5	0.57	(117)
Stollenquelle, Pfafers-Ragaz	36	0.29	(117)
Sotsassquelle, Schuls		0.42	(117)
Carolaquelle, Tarast	7	0.46	(117)
Kurhaus, Acquarossa	25	1.24	(117)
Thomas, Val Sinestra	8	0.26	(117)
Les Trois Pigeons, Valangin		0.24	(80)
Come Girard, Locle		0.26	(80)
Vioulou, Paturage, Locle		0.37	(80)
Eplatures		0.15	(80)

ASIA

Source	t°C	mμCl ⁻¹ , Water
INDIA (122)		
Kaira District, Bombay		
Hot Spring	67	33.0 to 62.1
Cold Spring	28	33.9

Source	t°C	mμCl ⁻¹	
		Water	Gas
JAPAN (42)			
Kami-no-yu, Tamatsukuri	64	1.08	10.18
Kami-no-yu, Misasa	71	51.69	
Kabu-yu, Misasa	45	3.72	22.82
Kaminoyu, Dogo	47	1.45	8.5
Tama-no-i, Dogo	cold	0.39	
Hirano, Tansun-sen	26	0.07	0.21
Gosho-no-yu, Kinokuni	60	3.06	
Ko-no-yu, Kinokuni	57	0.94	
Furosen, Beppu	58	0.07	
Kamigawara No. 1, Masutomi	22	301.2	
Kuridaira No. 1, Masutomi	16	214.7	550.6
Yunosawa-Onsen, Innai-Yunosawa	41	0.43	
Takinoyu, Noboribetsu	72	0.074	
Yojo-Kwan-no-yu No. 1, Togo	50	1.12	
Jizo-no-yu, Kusatsu	57	0.057	0.065
Akakura-Onsen, Akakura	62	0.43	
Ji-no-yu, Isobe	9	1.55	0.74
Arima-Onsen, Arima	52	0.92	
Maruyama-Kosen, Arima	19	3.01	
Zui-hoji-Onsen, Arima	31	13.8	
Arifuku-Onsen, Arifuku	43	0.80	
Kizu-no-yu, Asama	44	0.51	
O-yu, O-yu	57	1.13	trace
Kami-no-yu, Oyu	58	0.4	
Shimo-jyaya-no-yu, Sekigane	44	10.95	
Soto-no-yu, Katsura	29	0.31	
Yunotsumi-no-yu, Atsumi		0.40	
Awazu-Onsen, Awazu	54	0.35	
Kami-no-moto-yu, Bobata	14	4.35	
Goshiki-Onsen No. 2, Goshiki	39	0.80	
Tsubataya-uchi-yu, Shibu	48	0.11	
Hie-no-yu, Kaminoyana	62	0.86	5.5
Shiotsu-no-Tsubo, Katayamazu	79	0.47	8.79
Gosho-no-yu A, Kinokuni	63	2.67	
Koyabara-Onsen, Koyabara	38	1.37	2.95
Murasugi-Kosen No. 1	26	18.04	
Osakaya-no-yu, Musashi	45	1.17	11.8
Shirataki-no-yu, Nakabusa	60	0.59	
Tsuru-no-yu, Mikko-Yumoto	62	0.85	
Shin-yu, Unzen	38	0.85	

Source	°C	m μ Ct ⁻¹	
		Water	Gas
Ogawa-Onsen No. 2.....	49	1.01	
Omaki-Onsen, Omaka.....	49	0.48	
Taki-no-yu, Onogawa.....	70	2.37	
Umeka-no-yu, Owani.....	62	4.21	
Shigaku-Onsen, Shigaku.....	47	0.43	0.64
Ena-Kosen, Takayama.....	10	102.2	
Takarazuka-Tansan-sui, Takarazuka	19	1.20	0.72
Tochiomata-no-yu, Tochiomata.....	39	9.40	
Wakazaki-no-yu No. 1, Wakura.....	93	2.52	33.9
Yamanaka-Onsen, Yamanaka.....	45	0.62	
Yamashiro-Onsen.....	69	0.25	
Tottori-Onsen, Yoshikawa.....	48	1.19	
Kasuga-Onsen, Teramadu.....	29	0.22	0.88
Kabu-yu, Yudani.....	32	1.54	8.65
Sento, Yukiku.....	67	0.23	3.34
Kabu-yu, Yummra.....	91	0.31	
Sagi-no-yu, Yunogo.....	38	0.31	1.95
Taki-no-yu, Yunokawa.....	50	0.74	8.23
Shinyu, Yunotsu.....	4	1.8	0.19

Source	°C	m μ Ct ⁻¹ Water	Lit.
PHILIPPINE ISLANDS			
Sibul Springs, Bulacan.....		1.28	(135)
Pansol Springs, Laguna.....		none	(135)
Bambangan Spr., Laguna.....		0.15	(135)
Adukpung Spr., Kiangnan.....		1.33	(37)
Artesian Well, Batangas.....		2.11	(135)
Sinaba Spring, Laguna.....		1.3	(37)
Mairut Salt Spr., Bontoc.....	100	none	(37)
Salinas Salt Spring, Nueva Vizcaya	31	0.095	(37)

AFRICA

Source	°C	m μ Ct ⁻¹ Water
ALGERIA (85)		
Bains de la Reine, near Oran.....	50	13.1
Louise, A Hammam Bou Hadjur.....	44	22.4
Hotel de Vichy, A Bou Haniffa.....	55	1.3
d'Alma T'zoumoulal.....	17	5.3

THE LITHOSPHERE

Uranium and Thorium Radioactive Minerals

The numbers following the name of the mineral represent weight percent of U, resp. Th. The qualitative chemical composition is indicated in parentheses (), the locality in brackets []; R = "rare earths;" aq. = "hydrous."

A. Aeschynite: U 0.3, Th 0-20 (RNbTaO₃). *Auerite:* Th 61 (ThSiPO₄). *Autunite:* U 50 (UCaPO₄aq.).

B. Becquerelite: U 70 (UO₃aq.) [Belg. Congo] (111). *Blomstrandite:* U 22 (TaNbUO₄).

C. Calcioclorite: Th 53 (RCaSiO₃aq.). *Carnotite:* U 53 (KUVO₃aq.). *Chalcokite:* (See Torbernite). *Cleveite:* U 60; Th 4 (UThYO₃). *Curite:* U 73 (UPbO₃aq.) [Belg. Congo] (106).

D. Dewindtite: U 50 (PbUPO₃aq.) [Belg. Congo] (108). *Dumontite:* U 56 (PbUPO₃aq.) [Belg. Congo] (114).

E. Ebighite: *Fluherite* (See Uranothallite). *Eliasite:* also Pitchblende (See Gummite). *Erdmanite:* Th 9 (FeCaThBSiO₃). *Euxenite:* (Polycrase) U 5-15 (RNbTaO₃aq.).

F. Fergusinite: (Bragite, Tyrite, Yttrotantalite) U 1-7, Th 2-5 (RNbTaO₃). *Freyalite:* Th 24 (RThSiO₃aq.). *Fritzscheite:* (UMnVO₃aq.).

G. Gadolinite: Th < 1 (RO₂SiO₃). *Gummite:* (Eliastite, Pitchblende) U 60 (UPbCaSiO₃aq.).

H. Hatchettolite: U 13 (UCaNaTaO₃). *Hokutolite:* (PbBaSO₄) [Japan] (42).

J. Johannite: U 56 (CuUSO₄aq.).

K. Kasolite: U 40 (PbUSiO₃aq.) [Belg. Congo] (107). *Kochelite:* (See Fergusinite).

L. Liebigite: U 31 (UCaCO₃aq.).

M. Mackintoshite: U 20; Th 42 (RUThSiO₃aq.). *Modjibite:* (A variety of Uranopilite). *Mendeleefite:* U 20 (UNbTiO₃) [Transbaikalia] (129). *Microtite:* U 1.6 (CaTaO₃). *Monasite:* Th 7.20 (RPO₃).

N. Naegite: U 2.5; Th 45 (ZrR₂SiO₄) [Japan] (42). *Niwenite:* (See Uraninite). *Nohite:* (See Samarskite).

O. Orangite: U 1-10; Th 65 (A variety of Thorite).

P. Parsonite: U 32 (PbUPO₃) [Belg. Congo] (112). *Phosphuranylite:* U 60 (UO₃PO₃aq.). *Pulbarite:* (PbUThSiO₃aq.). *Plumbonibate:* U 12 (PbUYNbO₃). *Pitchblende:* (See Uraninite). *Polycrase:* (See Euxenite). *Priorite:* (See Blomstrandite). *Pyrochlore:* Th 0.6 (RCaNbO₃).

R. Randite: (See Voglite). *Rowlandite:* U 0.4 (YSiO₃). *Rutherfordine:* U 65 (UO₃CO₃). *Rutherfordite:* (A variety of Fergusinite).

S. Samarskite: U 1-3 (RUNbTaO₃). *Schoepite:* (UO₃CO₃) [Belg. Congo]. *Schrockingerite:* U 71 (USiO₃aq.) [Belg. Congo] (110).

Soddyite: U 71 (USiO₃aq.) [Belg. Congo] (110). *Stasite:* U 50 (PbOPO₃aq.) [Belg. Congo] (109). *Skaldovskite:* U 55 (MgUSiO₃aq.) [Belg. Congo] (113).

T. Thorogummite: U 18; Th 36 (UThPbSiO₃). *Thorianite:* U 12; Th 65 (RThUO₃). *Trilonite:* Th 5-8 (Th, Ce, Ca, Ta, B, F, SiO₃). *Torbernite:* U 50 (UCaPO₃aq.). *Trögerite:* U 53 (UAsO₃aq.). *Tscheffkinite:* Th 1-17 (RFeSiTiO₃). *Thysanite:* U 65 (U(OH)₃SO₄).

U. Uraninite: (Pitchblende) U 65-80; Th 1-8 (UO₃RUPbO₃). *Uranocalcite:* (A variety of Uranopilite). *Uraconite:* (A variety of Uranopilite). *Uranocircite:* U 47 (BaUPO₃aq.). *Uranophane:* U 55 (UCaSiO₃aq.). *Uranopilite:* U 64 (UO₃CaSO₃aq.). *Uranosphaerite:* U 42 (UO₃BiO₃UO₃aq.). *Uranospite:* U 49 (UCaAsO₃aq.). *Uranothallite:* U 32 (CaUO₃aq.). *Uranothorite:* U 8; Th 52 (ThSiO₃).

V. Voglianite: (A variety of Uranopilite). *Voglite:* U 34 (CaCuUO₃aq.).

W. Walpurgite: U 16 (BiUAsO₃aq.).

X. Xenotime: U 3; Th 0-2 (YPO₄).

Y. Yttrocassite: U 2; Th 0-8 (YTlO₃). *Yttrotantalite:* U 0.6-2 (YNbTaO₃).

Z. Zuenerite: U 50 (CuUAsO₃aq.).

RADIOACTIVITY OF ROCKS

Ra unit = 10⁻¹² g Ra (element) per g. Th unit = 10⁻⁶ g Th (element) per g

IGNEOUS ROCKS

Name and locality	No. specimens	Ra mean	Lit.
Acidic Intrusives			
Charnockite			
Mysore State, India.....	3	0.09	(121)
Granite			
Mysore State, India.....	11	1.03	(121)
Dutch East Indies.....	5	4.9	(12)
Eisenach, Germany.....	1	3.5	(67)
Germany.....	7	9.8	(12)
France(1) Holland(2).....	3	8.8	(12)
St. Francois Co., Mo., U. S. A.....	1	1.5	(100)
Ireland.....	10	2.0	(46)
Leinster, Ireland.....	28	1.7	(28)
Th mean =	28	7.0	

Name and locality	No. specimens	Ra mean	Lit.	Name and locality	No. specimens	Ra mean	Lit.
Antarctic region				Acid Extrusives			
Th mean =	2	0.4	(29)	Ash			
South Sea Islands	2	1.76	(26)	Krakatoa near Sumatra Th mean =	1	9.0	(82)
Sumatra (1) Bohemia (1)	2	26.1	(35)	Kenyte			
Loetschberg Tunnel, Switz	7	2.3	(83)	Antarctic region	4	2.29	(29)
Various localities	63	2.7	(48)	Th mean =	4	12.0	
	1	1.63	(62)	Lavas			
	11	2.56	(123)	Various localities	18	3.4	(43)
Th mean =	86	20.5	(82)	Th mean =	15	24.0	
Monzonite				Liparite	2	4.7	(13)
Bella Monte, Tyrol, Austria	1	3.5	(13)	Phonolite			
Pegmatite				Kirchberg, Germany	1	0.9	(13)
Mysore State, India	2	4.17	(121)	Pitchstone			
Porphyry				Auckland Island, New Zealand	1	1.9	(26)
Campbell Is., New Zealand	1	2.8	(26)	Dutch East Indies	2	0.6	(13)
Various localities	10	2.8	(13)	Isle of Eigg, Scotland	1	1.53	(123)
Quartz				Meissen, Germany	1	3.0	(13)
Germany	3	16.0	(13)	Rhyolite			
Sumatra	1	1.3	(13)	Yellowstone Park, U. S. A.	6	2.21	(104)
Byenite				Trachite			
Borneo and Molucca Island	13	1.58	(13)	Mt. Erebus, Antarctic region	3	2.16	(29)
Mount Royal, Canada	1	1.1	(25)	Th mean =	3	13.0	
Voeges, France	1	13.2	(36)	Continental Europe	2	3.4	(13)
Norway	3	2.46	(123)	New Zealand	3	2.11	(26)
Various localities	8	8.3	(13)	Transandine Tunnel	7	0.58	(27)
	23	3.9	(48)	Th mean =	7	4.4	
Tingualite				Various localities	18	3.0	(48)
Mount Royal, Canada	2	3.65	(25)	Tuff	2	2.9	(46)
Tingualite porphyry				Transandine Tunnel	12	0.92	(27)
Germany	2	8.2	(13)	Th mean =	10	5.87	
Basic Intrusives				Basic Extrusives			
Diabase				Anamesite			
Borneo	2	0.85	(13)	Germany	2	1.8	(13)
Diabases and dolerites	8	1.0	(48)	Andesite			
New Zealand	1	0.43	(26)	Borneo and Molucca Is.	13	1.58	(13)
Diabase and gabbro				Basalt			
Germany	5	2.8	(13)	Deccans and Antarctic	14	2.0	(48)
Diorite				Mt. Erebus, Antarctic region	1	2.13	(29)
Borneo and Sumatra	4	0.78	(13)	Th mean =	1	14.5	
Various localities	8	1.6	(48)	Hebrides (mainly)	11	0.5	(48)
Dolerite				New Zealand	2	1.21	(26)
Isle of Canna, Scotland	1	0.57	(123)	Various localities	6	0.47	(123)
New Zealand	2	0.66	(26)		6	2.2	(46)
Dunite					4	0.35	(126)
Loch Scavaig, Scotland	1	0.31	(123)	Lava			
Essexite				Antarctic region	7	0.58	(29)
Mount Royal, Canada	1	0.26	(25)	Th mean =	7	4.7	
Gabbro				Vesuvius (1631-1906)	7	12.6	(43)
New Zealand	2	0.34	(26)	Th mean =	6	53.4	(82)
Gabbro and Norite	5	1.3	(48)	Limburgite			
Greenstone				Germany	1	2.9	(67)
Garrick Du, St. Ives, Eng.	1	0.52	(123)	Melaphyro			
Hypersthenite	1	0.06	(121)	Oberstein, Germany	1	1.9	(13)
Peridotite				Tepharite	3	8.7	(67)
Isle of Rum, Scotland	1	0.63	(123)	Trap			
Porphyry				Mysore State, India	43	0.21	(121)
New Zealand	1	0.99	(26)				

METAMORPHIC ROCKS

Name and locality	Ra		Th		Lit.
	No. specimens	Mean	No. specimens	Mean	
Amphibolite India					
Mysore State.....	1	0.82			(121)
Gneiss					
Freiburg, Ger.....	1	2.9			(67)
Various localities.....	14	2.1	14	8.7	(48, 82)
Gneiss (granitic)					
Tauern Tunnel.....	11	3.41	7	17.7	(62)
Gneiss (porphyritic)					
Tauern Tunnel.....	9	4.34	9	41.0	(62)
Quartzite					
Various localities.....			6	3.4	(48)
Villnos Gulch, Austria.....	1	54.7	1	5.79	(133)
Schist					
Lustre, Simplon Tunnel.....			1	10.4	(48)
St. Gothard Tunnel.....	33	3.4	33	11.6	(47)
Schist (chlorite)					
Mysore St., India.....	1	0.27			(121)
Schist (hornblende)					
Mysore St., India.....	11	0.19			(131)
From mines, Mysore St., India.....	17	0.25			(121)
Slate					
England.....	2	1.17			(124)
European.....			10	13.5	(48)
Germany.....	2	1.3			(13)
Tauern Tunnel.....	3	2.53	3	24.3	(62)
Slate (mica)					
From well boring, Beachville, Can.....	1	1.6			(25)

SEDIMENTARY ROCKS

Name and locality	No. specimens	Ra mean	Th mean	Lit.
Clay				
Montreal, Canada.....	2	1.17		(24)
England.....	3	0.79		(124)
England(1), Germany(1).....	2		10.2	(48)
Coal				
Alabama, U. S. A.....	11	0.106		(88)
Lens, France.....	1	0.97	3.3	(74)
Frankenholz.....	1	0.04	0.3	(74)
Coal ash				
Alabama coals.....	11	2.15		(55)
Lens, France.....	1	8.8	30.	(74)
Frankenholz.....	1	2.0	15.	(74)
Flint				
Terling, Essex, Eng.....	1	0.49		(124)
Grauwacke				
Wipperfurth, Germany.....	1		24.	(48)
Limestone				
Beachville, Ont., Can.....	6	1.02		(25)
Montreal, Canada.....	2	0.91		(25)
Deccan, India.....	1	0.25		(124)
England.....	7	1.13		(124)
Germany(2), Ireland(1).....	3		2.3	(44)
New Zealand.....	2	0.37		(26)
Various localities.....	30		0.4	(44)

Name and locality	No. specimens	Ra mean	Th mean	Lit.
Limestone (oolithic)				
Yellowstone Park, U. S. A.....	2	2.9		(104)
Marble and limestone				
Various localities.....	8	1.3		(18)
Sand (Saxicava)				
Montreal, Canada.....	1	0.16		(24)
Sandstone				
From 850 ft. borehole, Baarlo, Limburg, Holland.....	2	1.04		(124)
Beachville, Canada.....	8	1.66		(13)
Various localities.....	1	0.50		(88)
	8		6.3	(48)

OCEANIC DEPOSITS

Name and locality	No. specimens	Ra mean	Lit.
Blue mud			
1240 fa. E. coast N. Amer.....	1	3.1	(188)
Calcareous mud			
2225 fa. E. of Society Islands.....	1	22.2	(188)
Globergina ooze			
1990 fa. Middle S. Atlantic.....	2	6.5	(188)
1825 fa. Pacific W. of South America.....	1	7.4	(188)
570 fa. W. coast Ireland.....	2	6.3	(188)
2042 fa. Central Pacific.....	2	7.6	(188)
Radiolarian ooze			
Central Pacific.....	4	43.9	(188)
Red clay			
2740 fa. N. Atlantic, coast of Africa.....	4	17.6	(188)
2350 fa. Central Pacific.....	3	47.4	(188)
"Salt Lime" (gypsum from evap. sea water).....	1	0.016	(130)
Sea Salt.....	1	0.07	(124)
From evap. water of high seas.....	15	none	(40)

SOILS

Name and locality	No. specimens	Ra mean	Th mean	Lit.
Gravel—fine siftings				
Terling, Essex, Eng.....	2	0.65		(124)
Surface loams				
7 localities in E. and S. parts of U. S.....	7	1.97		(69)
Th mean =	5	4.5		(69)
Subsoils of above.....	7	1.52		(69)
Highest value for surface soils, 2.88; Lowest, 0.93.....				(69)
Highest value for subsoil, 3.8; Lowest 0.93.....				(69)
Loess, Heidelberg, 10.4×10^{-4} g Th per g.....				(48)
Mark, Ireland, 1.4×10^{-4} g Th per g.....				(48)

ROCKS FROM TUNNELS

Rock and section of tunnel	No. of specimens	Units	
		10^{-12} g Ra per g	10^{-12} g Th per g
The St. Gothard (47)			
Granites and gneiss			
Finsteraarhorn Massif.....	20	6.7	21.5
Altered sediments			
Unsermulde.....	18	3.8	13.4
Tessinmulde.....	18	2.7	4.8
Schists, etc.			
St. Gothard Massif.....	33	3.4	11.6
The Tauern, Austria (62)			
Granitic gneiss.....	Ra 10, Th 7	3.41	17.7
Porphyritic granitic gneiss.....	Ra 13, Th 9	4.34	41.0

ROCKS FROM TUNNELS.—(Continued)

Rock and section of tunnel	No. of specimens	Units	
		10 ⁻¹² g Ra per g	10 ⁻⁶ g Th per g
Slate	Ra 3, Th 3	2 53	24 3
The Loetschberg, Bernese Oberland, Switzerland ⁽⁸²⁾			
Anhydrite	2	3 4	
Aplete	2	2 5	
Granite	7	2 3	
Limestone	16	1 5	
Quartz porphyry	1	2 5	
Quartz sandstone	1	4 3	
Schists			
Feldspathic	3	2 7	
Hornblende	2	3 1	
Lustre	2	3 4	
Mica	2	2 1	
Quartz	12	2 4	
Talc	16	1 5	
(Unclassified)	16	2 5	
The Transandine, Argentine-Chile ⁽²⁷⁾			
Andosites	Ra 2, Th 1	0 71	4 1
Mean Ratio, Th-Ra = 7 × 10 ³		0 79	5 6
Feldspathic Tuff	2	1 24	3 0
Trachytes	7	0 58	4 1
Tuff	Ra 8, Th 7	0 90	6 94

SPRING DEPOSITS

Country, name of spring, location	No. of specimens	Ra content*	Th content†	Remarks	Lit.
Austria					
Elizabethstollen, Gastein	1	2920	3970	Reissacherite	(62)
Rudolphstollen, Gastein	1	447	1988		(62)
Vilnos Gulch	4	75.37	7	A sinter	(133)
England					
Hot Springs, Bath	1	381			(124)
France					
Chomel, Vichy	1	250		Ferruginous	(52)
Hôpital, Vichy	1	700		Black	(52)
Carnot, Santenay	1	1500			(52)
Neris	1	950	5100	Black	(52)
Luxeuil	1	660	1100	Manganous	(52)
Germany					
Badochquelle	1	4		Surface seum	(67)
Ems, Hessen-Nassau	4	0 63	35		(133)
Johanngeorgenstadt, Saxony	3	681	89	Mainly hydromorphic; Range of Ra content, 10-1300	(4)
Italy					
Fiuggi	1	5		Tufa	(84)
Russia					
Borzhom Spring	2	13.9	147		(14)
United States					
Hatborn No. 1, Saratoga Springs, N. Y.	1	769			(71)

Country, name of spring, location	No. of specimens	Ra content*	Th content†	Remarks	Lit.
Geyser, Saratoga Springs, N. Y.	1	17			(71)
Pump Well No. 4, Saratoga Springs, N. Y.	1	63			(71)
Palace Spring, Hot Springs, Arkansas	1	1724			(99)
Avenue Spring, Hot Springs, Arkansas	1	140			(99)
Horseshoe Spring, Hot Springs, Arkansas	1	2.3			(99)
Various springs, Hot Springs, Arkansas	11	175			(99)
Main Springs, Mammoth Hot Springs, Yellowstone	1	8.8		Travertine	(104)
Hot River, Mammoth Hot Springs, Yellowstone	1	8.1			(104)
Bench Springs, Upper Geyser Basin, Yellowstone	1	0.95			(104)
Fish Cone, West Thumb, Yellowstone	1	0 19			(104)
Fire Hole Lake, Lower Geyser Basin, Yellowstone	1	6 7			(104)
Doughty Springs, Delta Co., Colorado	2	1654			(100)

* Unit, 10⁻¹² g Ra per g.

† Unit, 10⁻⁶ g Th per g.

METEORITES

Class and locality	Ra in 10 ⁻¹² g per g	Remarks	Lit.
Stony			
Dhurmala, India	0 53		(123)
Coahuila, Coahuila, Mex.	7 69	Normal hexahydrite	(87)
Toluca, Xiquepelco, Mex.	0 21	Medium octahydrite	(87)
Iron			
Augusta Co., Va., U. S. A.	0 0022	2 specimens	(125)
Stone			
Various localities	0 75	Mean of 16	(87)
		Range 2.17-0.073	
Iron			
Various localities	0 69	Mean of 2	(87)
	none	Mean of 3	(87)

NATURAL GASES

Source and Locality	No. samples	Milli-micro-Curies (10 ⁻⁶ Curies) Ra per liter	Lit.
Canada			
Medicine Hat, Alberta	3	0.064	(97)
Suffield-Brooks Calgary	6	0.064	(97)

Source and Locality	No. samples	Milli-micro-Curies (10 ⁻⁶ Curies) Ra per liter	Lit.
3 British Columbia wells		0 47	(97)
Brant, Anondoga, Ontario	4	0 42	(97)
Tilbury, Ontario		0 016	(97)
England			
Marsh gas, environs of Cambridge	10	0 3	(95)
France			
Alsace		7 1	(17)
Germany			
Nuengamme, Hamburg		0 24	(17)
Hungary			
Well No. 14, Bazna		0 043	(17)
Japan			
Well No. 22, Takiya		0 035	(42)
Rumania			
Well No. 103, Campina			(17)

LITERATURE

(For a key to the periodicals see end of volume)

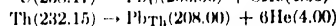
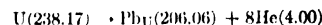
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AGES OF MINERALS AND ROCKS BASED ON RADIOACTIVE CHANGES

ROGER C. WELLS

There are a number of ways of estimating the ages of minerals by combining chemical and radioactive data, all based on the assumption that the law of each radioactive change is expressed by its constant, λ , over the periods and for the quantities of each element involved. The two principal methods employ the ratios of helium to uranium and thorium and of lead to uranium and thorium. The helium ratio is admitted to give minimum values on account of the loss of helium with lapse of time; and the lead ratio involves the assumption, or actual proof by means of an atomic weight determination, that the lead is wholly of radioactive origin. Associated rocks are generally assumed to be as old or older than the minerals found in them. Attempts have also been made to calculate the ages of rocks from determinations on bulk samples (Russell).

For the two methods mentioned the fundamental changes and data are:



One gram of uranium in equilibrium with its products gives 9.4×10^4 alpha particles per sec (15) or 1.96×10^{-11} gram He and 1.26×10^{-10} gram Pb per year.

One gram of thorium in equilibrium with its products gives 2.7×10^4 alpha particles per sec, or 5.5×10^{-12} gram He and 4.8×10^{-11} gram Pb per year.

The ages of minerals may be calculated from the analytical data and the preceding information by simple proportion in the case of helium (equation 1) and also in the case of lead with sufficient accuracy for most purposes (equation 2), but if the percentage of lead is relatively large the theoretical relation is given by equation 3, where U, Th, Pb = percentage U, Th, Pb in the mineral.

$$(1) \text{ Age} = \frac{\text{cm}^3 \text{ He/g}}{U + 0.28Th} \times 910 \text{ million years}$$

$$(2) \text{ Age} = \frac{\text{Pb}}{\text{U} + 0.38\text{Th}} \times 7900 \text{ million years}$$

$$(3) \text{ Age} = \frac{\log(\text{U} + 0.38\text{Th} + 1.156\text{Pb}) - \log(\text{U} + 0.38\text{Th})}{6.5 \times 10^{-4}}$$

million years

Thorium minerals with Th/U greater than 3 are secondary

and younger than uranium minerals from the same geological horizon⁽¹⁹⁾. Low lead ratios have little significance on account of the ease with which certain minerals abstract lead from circulating natural waters. The atomic weight of the lead should be determined whenever possible in order to make certain that the lead is of radioactive origin. In general, only primary minerals are suitable for age determinations.

AGES OF MINERALS FROM HELIUM RATIOS BY EQUATION (1)

(The values in parenthesis are calculated from the lead ratios for comparison)

Mineral	Geologic horizon	He cm ³ /g	U Percent	Th Percent	Age million years	Lit
Phosphatic shark's teeth, Florida	Pliocene	1.7×10^{-6}	0.021	0	0.07	(23)
Phosphatic shark's teeth, Felixtowe, Eng.	Pliocene	1.6×10^{-6}	0.013	0	0.11	(23)
Phosphatic nodules, Felixtowe, Eng.	Pliocene	1.0×10^{-6}	0.0041	0	0.22	(23)
Carnotite, Montrose Co., Colo.	Post Tertiary	0.01	2.53	0	3.6	(23)
Zircon, Campbell I., New Zealand	Tertiary	8.1×10^{-4}	0.029	0.07	1.5	(23)
Pitchblende, Joachimthal		0.107	62.4	0	1.6	(23)
Sphaerosiderite, Germany	Oligocene	1.65×10^{-6}	0.00015	0.00017	7.6	(23)
Zircon, Mayen, Eifel	Tertiary	1.14×10^{-4}	0.0108	0.00073	9.4	(23)
Hematite, Co. Antrim, Ireland	Eocene	1.21×10^{-6}	0.00022	0.00073	26	(23)
Zircon, Auvergne	Tertiary	2.12×10^{-4}	0.031	0	6.2	(23)
Phosphatic nodules, Cambridge, Eng.	Upper Cretaceous	3.0×10^{-6}	0.0091	0	3.0	(23)
Phosphatic nodules, Bedfordshire	Lower Cretaceous	2.1×10^{-6}	0.0049	0	3.9	(23)
Zircon, Cheyenne Canon, Colo.	Paleozoic	0.0193	0.109	0.10	128	(23)
Hematite, Cumberland, Eng.	Above Carboniferous	1.6×10^{-4}	0.0011	0	130	(28)
Limonite, Forest of Dean	Carboniferous	1.5×10^{-4}	0.00087	0.00043	140	(23)
Sipilite, Little Frier Mt., Va.	Carboniferous (?)	0.59	2.42	4.33	147	(23)
Euxenite, Arendal, Norway	Pre-Cambrian	0.73	2.41	2.39	210(1240)	(23)
Samaraskite, Mitchell Co., N. C.	Carboniferous (?)	1.5	8.73	1.28	160	(23)
Phosphatic nodules, Bala, England	Silurian	1.5×10^{-4}	0.0028	0	49	(23)
Phosphatic limestone, Chirbury, Shropshire, Eng.	Silurian	5.6×10^{-6}	0.0067	0	76	(23)
Uraninite, Katanga	Pre-Silurian	8.88	77.76	0	104(665)	(4)
Zircon, Brevig, Norway	Post-Devonian	0.0099	0.113	0.288	46	(23)
Hematite, Caen	Devonian	9.8×10^{-6}	0.00037	0.0013	120	(23)
Zircon, Green River, N. C.	Paleozoic	0.0255	0.11	0.264	126	(23)
Zircon, Ural Mts.	Paleozoic	0.030	0.0538	0.408	160	(23)
Uraninite, Colo.	Tertiary	0.15	72.62		18(58)	(11)
Uraninite, N. C.	Post-Cambrian	2.96	77.0	2.44	34(380)	(11)
Thorianite, Sab. Province, Ceylon	Pegmatite in Charnokite Series	1.5	9.87	63.54	50(460)	(8)
Thorianite, Galle Province, Ceylon	Pegmatite in Pre-Cambrian	9.3	20.6	57.55	230(400)	(23)
Uraninite, Änneröd	Pre-Cambrian (?)	9.4	66.2	5.27	120(890)	(11)
Uraninite, Portland, Conn.	Devonian (?)	19.2	72.0	8.79	230(290)	(11)
Uraninite, Branchville, Conn.	Silurian (?)	21.0	74.3	5.72	250(400)	(11)
Microlite, Amelia Court House, Va.	Carboniferous (?)	0.05	1.60	0	280	(23)
Cuprouranite, Cornwall	Devonian	0.10	50.9	0	1.8	(23)
Orangite, Brevig, Norway	Middle Devonian	0.11	0.85	42.6	7.9(22)	(23)
Zircon, Ural Mts.	Paleozoic	0.030	0.053	0.409	160	(23)
Thorianite, Ceylon	Balangoda series	8.9	11.0	67.7	270(500)	(23)
Zircon, Kimberly	Paleozoic	0.032	0.091	0.012	310	(23)
Phosphatic nodules, Loch Broom	Pre-Cambrian	8.3×10^{-6}	0.084	0	9.0	(23)
Gadolinite, Ytterby	Pre-Cambrian (?)	2.43	2.50	7.56	480	(23)
Aeschynite, Ural Mts.		0.98	2.12	7.19	210	(23)
Cyrtolite, Llano Co., Texas	Pre-Cambrian (?)	1.15	3.11	4.44	240	(23)
Uraninite, S. Dak.	Pre-Cambrian (?)	4.35	66.90	1.89	59(540)	(4)
Zircon, Ceylon	Ancient	0.0283	0.086	0.010	290	(23)
Zircon (?), Renfrew Co., Ontario	Archaeon	0.0114	0.0155	0.0008	660	(23)
Aeschynite, Hitteroe, Norway		1.09	7.98	1.11	1200	(23)

AGES OF MINERALS FROM LEAD RATIOS BY EQUATION (3)

Mineral	Geologic horizon	Pb Percent	U Percent	Th Percent	Th/U	Age million years	Lit.
Carnotite, Montrose Co., Colo.	Tertiary	0.17	45.6			20	(18)
Johannite, Colo.	Tertiary	0.76	47.2			123	(18)
Brannerite, Idaho	Tertiary	0.18	46.97	4.1	0.11	20	(9)
Uraninite, Gilpin Co., Colo.	Tertiary	0.65	72.60			69	(11)
Thorite, Ceylon	Young mineral in pegma- tite in Pre-Cambrian	2.86	72.00	8.70	0.12	280	(11)
Hatchettolite, Hybla, Ont.	Pre-Cambrian (?)	0.50	13.72	0.46	0.03	270	(84)
Polycrase, Brazil	Pre-Devonian	0.59	5.49	4.59	0.84	600	(8)
Allanite, Blueberry Mtn., Mass.	Young mineral in pegma- tite	0.036	0.11	2.01	18.3	310	(17)
Freyalite, Brevig, Norway	Post-Devonian (Lawson)	0.0028	0.0526	6.330	120.3	8.8	(19)
Tritomite, Brevig, Norway	Post-Devonian (Lawson)	0.0026	0.0631	5.150	81.6	9.9	(19)
Thorite, Brevig, Norway	Post-Devonian (Lawson)	0.0196	0.4072	29.20	71.7	13.3	(19)
Thorite, Brevig, Norway	Post-Devonian (Lawson)	0.0810	0.7200	49.43	68.6	32.0	(19)
Thorite, Brevig, Norway	Post-Devonian (Lawson)	0.0760	0.7000	47.25	67.5	31.4	(19)
Orangite, Brevig, Norway	Post-Devonian (Lawson)	0.0570	1.2437	49.44	39.7	22.1	(19)
Orangeite, Brevig, Norway	Post-Devonian (Lawson)	0.0542	1.1825	45.03	38.1	22.8	(19)
Homolite, Brevig, Norway	Post-Devonian (Lawson)	0.0121	0.2442	2.900	11.9	69.1	(19)
Mosandrite, Brevig, Norway	Post-Devonian (Lawson)	0.0024	0.0432	0.287	6.64	112	(19)
Eudidymite, Brevig, Norway	Middle Devonian	0.0007	0.0060	0.036	7.00	230	(19)
Euclite, Brevig, Norway	Middle Devonian	0.0012	0.0170	0.040	2.35	280	(19)
Thorite, Brevig, Norway	Middle Devonian	0.4279	10.1040	14.20	1.41	210	(19)
Zircon, Brevig, Norway	Middle Devonian	0.0055	0.1460	0.114	0.78	220	(19)
Zircon, Brevig, Norway	Middle Devonian	0.0085	0.1941	0.082	0.42	280	(19)
Pyrochlore, Brevig, Norway	Middle Devonian	0.0093	0.1855	0.075	0.40	330	(19)
Aegerine, Brevig, Norway	Middle Devonian	0.0015	0.0253	0.007	0.28	400	(19)
Zircon, Brevig, Norway	Middle Devonian	0.0370	0.9310	0.141	0.15	280	(19)
Biotite, Brevig, Norway	Middle Devonian	0.0069	0.1602	0.017	0.11	310	(19)
Uraninite, Spruce Pine, N. C.	Post-Cambrian (?)	3.90	77.01	2.44	0.03	380	(11)
Thorianite, Galle Province, Ceylon	Pegmatite in Pre-Cambrian	2.41	24.13	55.95	2.32	400	(19)
Betafite, Madagascar	Pegmatite, uncertain	0.35	22.58	0.98	0.04	120	(19)
Thorianite, Sa. Province, Ceylon	Pegmatite in Pre-Cambrian	2.09	9.87	63.54	6.45	460	(8, 19)
Uraninite, Branchville, Conn.	Silurian (?)	4.03	73.00	6.09	0.81	400	(11)
Uraninite, Katanga	Pre-Silurian	6.51	77.76	0		620	(4)
Polycrase, Slättåkra, Sweden		0.85	8.45	3.08	0.36	650	(8)
Uraninite, Ånnerød, Norway	Pre-Cambrian (Moss district)	8.30	66.21	5.28	0.08	890	(11)
Uraninite, Elvestad	Pre-Cambrian (Moss district)	9.35	65.82	7.46	0.11	970	(11)
Ånnerødite	Pre-Cambrian (Moss district)	2.22	15.25	2.08	0.14	990	(8)
Mackintoshite, Llano Co., Tex.	Pre-Cambrian (?)	3.47	19.75	39.83	2.02	730	(1)
Yttrocrasite, Llano Co., Tex.	Pre-Cambrian (?)	0.45	2.28	7.69	3.38	640	(1)
Uraninite, Llano Co., Tex.	Pre-Cambrian	9.43	56.45	6.65	1.18	1130	(1)
Uraninite, Llano Co., Tex.	Pre-Cambrian	9.35	55.18	5.88	1.07	1150	(1)
Yttrialite, Llano Co., Tex.	Pre-Cambrian	0.74	1.45	9.53	6.5	1040	(1)
Yttrialite, Llano Co., Tex.	Pre-Cambrian	0.79	0.69	10.55	15.3	1190	(1)
Fergusonite, Ytterby, Sweden	Middle Pre-Cambrian	0.18	1.06			1200	(1)
Gadolinite, Ytterby, Sweden	Middle Pre-Cambrian	0.36	2.41			1100	(1)
Zircon, Ceylon	Pre-Cambrian	0.092	0.56	0.01	0.02	1150	(14)
Uraninite, Villeneuve, Quebec	Middle Pre-Cambrian	10.46	64.74	6.41	1.00	1110	(11)
Uraninite, Parry Sound, Ontario	Middle Pre-Cambrian	10.83	69.19	2.83	0.04	1090	(8)
Uraninite, Arendal, Norway	Pre-Cambrian (Arendal district)	10.16	61.27	3.65	0.06	1150	(11)
Uraninite, Black Hills, S. Dak.	Pre-Cambrian	15.24	66.90	1.89	0.03	1540	(4)

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(For a key to the periodicals see end of volume)

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SELECTED PHYSICAL PROPERTIES OF STARS AND NEBULAE

ALFRED H. JOY

CONTENTS.—(A) Classification of stellar and nebular spectra; (B) Stellar temperatures, masses, and densities; (C) Stellar diameters. (Data pertaining to the solar spectra will be found with other spectroscopic data; consult index)

A. CLASSIFICATION OF STELLAR AND NEBULAR SPECTRA

The system¹ is that developed at Harvard College Observatory, as used by Miss Cannon in the Henry Draper Catalogue. Except where the exact nature of the spectral changes is not fully understood, decimal sub-classes, representing progressive steps toward the succeeding class, are used. In denoting objects by their catalogue numbers, the following abbreviations are used: B. D. = Bonn Durchmusterung; C. D. M. = Cordoba Durchmusterung; I. C. = Dreyer's Index Catalogue of nebulae and clusters; N. G. C. = New General Catalogue by Dreyer. The number, or numbers, following the abbreviation is the catalogue designation of the object.

Class P includes practically all the gaseous nebulae. Its unique characteristic is the appearance of lines from an unknown origin (nebulium). In addition there are many lines of H, He, C, He+, C+, and N+. All lines are bright and usually sharp. (The order of the Harvard (2) subdivisions should probably be reversed to indicate decreasing intensity of radiation.)

Class	Typical object	Spectral criteria
Pa	I. C. 418	$\lambda 5007$ and $\lambda 1959$ faint, $\lambda 3869$ not seen
Pb	Orion nebula	$\lambda 5007$ and $\lambda 1959$ stronger
Pc	I. C. 4907	$\lambda 3863$ conspicuous
Pd	N. G. C. 6826	$\lambda 5007$ and $\lambda 1959$ strong
Pe	N. G. C. 7602	$\lambda 4686$ present
Pf	N. G. C. 40	$\lambda 4686$ strong

Wright (11) has divided these spectra into three classes: Class I, having $\lambda 4686$ present, Class II, with $\lambda 4686$ absent but $\lambda 3869$ present, and Class III with both $\lambda 4686$ and $\lambda 3869$ absent.

Class O is distinguished by the presence of the Pickering series of ionized helium, upon a strong continuous spectrum with maximum intensity far in the violet. The elements present are H, He, He+, C+, N+, Mg+, O+, CH, NH, SiH, OH, SiIV. Broad emission bands occur in the earlier subdivisions. Few absorption lines are found in sub-classes Oa, Ob, Oc, which make up the group known as Wolf-Rayet stars. (The Harvard sub-classes Od, Oe, and Oe5 which have absorption lines and in some cases narrow emission lines as well, are included in the subclasses O5 to O9 as suggested by H. H. Plaskett (7), the basis of classification being the absorption lines.)

¹ Adopted by International Astronomical Union. It defines a temperature scale which is linear within the present errors of measurement.

Class	Typical object	Spectral criteria
Oa	B. D. +35° 4013	Band $\lambda 4648$ stronger than $\lambda 4686$
Ob	B. D. +35° 4001	$\lambda 4686$ stronger than $\lambda 4648$
Oc	C. D. M. -41° 10972	Bands narrower. $\lambda 4686$ twice $\lambda 4638$
O5	B. D. +1° 1302	Pickering series very strong. H lines weak, $\lambda 4634$ and $\lambda 4640$ (NIII) present
O6	B. D. +44° 3639	Neutral helium appears
O7	9 Sagittae	$\lambda 4471$ (He), $1.4 \times \lambda 4541$. $\lambda 4089$ (SiIV), $0.8 \times \lambda 4097$ (NIII)
O8	α Orionis	$\lambda 4481$ (Mg+) appears
O9	10 Lacertae	H stronger, He weak. $\lambda 4471$, $2.7 \times \lambda 4541$. $\lambda 4089$, $1.4 \times \lambda 4097$

Class B is characterized by the presence of helium, which has its maximum intensity in B2. The principal elements are those of class O, with the addition, in the later sub-classes, of lines of the ionized atom of several of the metals, such as Sr, Ba, and Fe. The H and K lines of calcium are found in increasing strength in this class. The hydrogen lines increase through the sub-classes, reaching a strong maximum at A0 of the following class.

Class	Typical object	Spectral criteria
B0	γ Orionis	Pickering series weak, $\lambda 4649$ (OII), $\lambda 4116$ (SiIV), and $\lambda 4089$ (SiIV) maximum intensity
B1	β Canis Majoris	He more prominent than O and Si.
B2	γ Orionis	$\lambda 4116$ not seen. $\lambda 4089$ and $\lambda 4649$ faint
B3	η Aurigae	Strongest lines are helium
B5	q Tauri	$\lambda 4128$ and $\lambda 4131$ (SiII) stronger than $\lambda 4121$ (He). $\lambda 4481$, $0.7 \times \lambda 4471$
B8	β Orionis	$\lambda 4481$ equal to $\lambda 4471$
B9	λ Aquilae	H strong. He weak. Several prominent enhanced metallic lines

Classes A, F, G, K and M, which contain the largest numbers of the stars, show a gradual increase in the number and intensity of the lines of neutral metallic elements of the lower atomic weights, and a decrease in the intensity of lines due to ionized elements. Compounds produce bands in the later classes. The sun's spectrum is G0, and is intermediate between that of the white and the red stars.

Class	Typical object	Spectral criteria
A0	α Lyrae	H maximum strength. Very few other lines except $\lambda 4481$ (Mg+)
A5	ρ Sagittarii	K (Ca+) stronger than H δ . $\lambda 4290$ well marked. $\lambda 4481$ weaker
F0	σ Bootis	K $3.0 \times$ H δ and equal to H + He

Class	Typical object	Spectral criteria
F5	α Canis Minoris	Fraunhofer band G first seen. Numerous solar lines
G0	α Aurigae	Solar type. H not conspicuous. G band well defined, H δ = λ 4226.
G5	γ Piscium	H γ fainter than λ 4325
K0	α Bootis	G band conspicuous, λ 4226 strong. Hydrogen weaker
K5	α Tauri	λ 4226 very wide. λ 4254 and λ 4274 (Cr) strong. Titanium bands very faint
M0	β Andromedae	Titanium bands well marked
M5	α Herculis	Titanium bands very strong. Metallic lines fewer

Class R and N stars show the carbon bands in increasing strength. The more advanced stars of class N have very little light in the violet or blue portions of the spectrum. They are the reddest stars known. Typical stars: Class R, B. D. -10° 5057; Class N, 19 Piscium.

Class S spectra resemble those of class K5 except for the presence of bands of zirconium, and other peculiarities in the region near λ 4650. The line λ 4554 of Ba + is conspicuous.

Class Q stars are the novae. Near maximum of outburst their spectra are characterized by numerous wide emission bands of hydrogen and helium, and by absorption lines of ionized elements, especially titanium and iron. As the star decreases in light, both absorption and emission lines of N and O become more prominent. In the later stages, bright nebular bands appear; these are ultimately superseded by the bright bands of the Wolf-Rayet spectrum.

B. STELLAR TEMPERATURES, MASSES, AND DENSITIES

Giant stars are characterized by large mass, low density, and great total luminosity. Dwarf stars have smaller mass, higher density, and less total luminosity. Both are found in all classes, but the greatest contrasts between the two are found in the cooler stars of classes K and M. The continuous spectrum of dwarfs has its maximum shifted towards the violet, as compared with that of giants of the same spectral class, indicating that their absolute temperature is about 15% higher than that of the giants. Even with small dispersion, pronounced differences between giants and dwarfs may be noticed in the distribution of intensity in their line spectra. These differences probably arise from differences in the density gradients; they show a correlation with the absolute magnitude and mass of the stars. The low densities of giants favor the enhancement of those lines (absorption) which are produced under conditions of high excitation, such as the spark lines of the metals; the high density of dwarfs favor those produced by low excitation, such as the resonance lines of neutral atoms. The lines λ 4077, λ 4215 (ionized Sr) are much strengthened in giants, and weakened in dwarfs; the reverse is true of λ 4226 (Ca), λ 4454 (Ca), λ 4607 (Sr).

STELLAR TEMPERATURES, MASSES AND DENSITIES

Units: Temperature, 1000°C abs.; Mass, Mass of Sun; Density, g/cm³.

Class	Effective temperature (giants*)					Mean mass (g)		Mean density (g)	
	A†	P‡	C§	S||	F¶	Giants	Dwarfs	Giants	Dwarfs
Oa		23		23					
O5					30	50 (6)			
B0		20	13	18	19	10			
B3					16	9			0.22
B8	16					7.3			0.24
A0	14	11	8	12	10	7.0	0.16		0.36
A5		9				5.6	0.071		0.40
F0		7.5		9	7.5	4.3	0.025		0.40
F5	6	7.2	6			3.2	0.0078		0.39
G0	5.8	6.5	6	7	6	2.6	0.0025		0.63
G5		4.5				2.8	0.00087		1.2
K0		3.7	4		4.5	3.0	0.00018		1.3
K5	3	3.5	3.5		3.9	2.6	0.000026		1.4
M0		3	3	5	3	2.0	0.000006		5.4
M5	2.5	2.95		4					
N		2.3							

* Temperatures of dwarfs are 10% to 20% higher than giants of same class (indirect methods)

† Abbot (1). By radiometer

‡ Potsdam observations. Wilong *et al.* (10)

§ Coblentz (2). By thermocouple

|| Saha (5). Calculated from initial appearance of certain spectral lines under pressure of 0.1 atmosphere. (See note ¶.)

¶ Fowler and Milne (4). Calculated from maximum intensity of certain spectral lines under pressure of 1.31×10^{-4} atmospheres, assuming 10,000° corresponds to maximum of Balmer lines of H. These temperatures, and those of Saha, are for the reversing layer, true effective temperature is somewhat higher

STELLAR DIAMETERS

Unit: Linear Diameter, 10^6 km.

Star	Class	Parallax	Diameter	
			Angular*	Linear
α Tauri	K5	0.055"	0.022"	60
α Orionis	M2	0.019	0.044	347
α Bootis	K0	0.088	0.022	37
α Scorpii	M1	0.017	0.040	353

* Measured by means of interferometer (8)

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(For a key to the periodicals see end of volume)

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DISTRIBUTION OF STARS

FREDERICK H. SEARES

Restriction.—No account is here taken of globular star clusters nor of stars included in spiral nebulae, many of which contain objects whose essentially stellar character can no longer be doubted.

Apparent Distribution and Number.—Statistically considered, the stars are distributed over the face of the sky with a high degree of regularity, their numbers gradually increasing as the Milky

Way is approached from either side. The Milky Way defines what is very nearly a plane of symmetry, and for a first approximation, systematic difference between the two hemispheres, progressive changes in galactic longitude, and all local irregularities can be ignored. The resulting mean distribution, as found by Seares and van Rhijn, is shown in Table I.

To apparent magnitude (see p. 39) $m = 13.5$ the results depend on data covering a large portion of the sky. From $m = 13.5$ to 18.5 they are derived from counts of stars on photographs of the 139 Selected Areas of Kapteyn between the North Pole and declination -15° . For still higher values of m , the values of $\log N_m$ are extrapolated, but the uncertainty consequent to the extrapolation itself is probably small. Excepting in low galactic latitudes, there is little or no systematic uncertainty arising from the particular choice of fields used for the counts. To $m = 16$ the magnitude scale is the mean of several closely accordant determinations made at different observatories, and is probably accurate within a few hundredths of a magnitude. Below this limit the scale depends wholly upon observations made at the Mount Wilson Observatory. Although this part of the scale has not been confirmed by independent measures made elsewhere, it

has been established by methods successfully used for the brighter stars.

The indicated total, to the twenty-first photographic magnitude, of all stars in the sky is 890 000 000, and to the twentieth visual magnitude, 1 000 000 000. Barring losses of light by absorption, scattering etc., the increase in $\log N_m$ for a uniform distribution of stars throughout space would be 0.6 per unit of magnitude. The observed increase nowhere attains this value; the stars thin out with increasing distance from the sun, and at great distances they thin out more rapidly than near the sun; these changes are most pronounced in the direction of the poles of the Milky Way. If the law of decreasing space density indicated by the stars accessible to observation holds for those beyond present telescopic reach, the total number of luminous stars in the galactic system must be of the order of 3×10^{10} .

TABLE 1.—LOGARITHMS OF NUMBERS (N_m) OF STARS, OF MAGNITUDES LESS THAN m , PER SQUARE DEGREE IN DIFFERENT GALACTIC LATITUDES ⁽¹⁾

Units: Last column; m = visual magnitude; average $N_m = 1$, if $m = 8$. Other columns; m = international photographic magnitude ⁽²⁾; $N_m = 1$, if $m = 8$, Lat. = 0. Galactic pole: R. A. 124^h 12^m 20^s, Dec. +27° 21' (1875) (Gould).

m	Log ₁₀ N _m at latitude															Log ₁₀ (average N _m) between latitudes				
	0°	5°	10°	15°	20°	25°	30°	35°	40°	50°	60°	70°	80°	90°	0°-20°	20°-40°	40°-90°	0°-90°	0°-90° (v)	
4.0	2.19	2.17	2.12	2.05	3.99	3.93	3.87	3.82	3.78	3.74	3.71	3.69	3.67	3.66	2.12	3.88	3.73	3.94	2.11	
4.5	2.42	2.40	2.35	2.28	2.22	2.16	2.10	2.05	2.01	3.97	3.94	3.92	3.90	3.88	2.35	2.11	3.96	2.17	2.35	
5.0	2.65	2.63	2.58	2.51	2.45	2.39	2.33	2.28	2.24	2.20	2.17	2.15	2.13	2.12	2.58	2.34	2.19	2.40	2.60	
5.5	2.88	2.86	2.80	2.71	2.68	2.62	2.56	2.51	2.47	2.43	2.40	2.38	2.36	2.34	2.80	2.57	2.41	2.63	2.83	
6.0	3.11	3.08	3.03	2.97	2.90	2.84	2.79	2.74	2.70	2.65	2.62	2.60	2.58	2.57	3.03	2.80	2.64	2.85	3.07	
6.5	3.33	3.31	3.26	3.19	3.13	3.07	3.01	2.97	2.92	2.88	2.85	2.83	2.80	2.79	3.26	3.03	2.86	3.08	3.31	
7.0	3.56	3.53	3.48	3.41	3.35	3.29	3.21	3.15	3.10	3.07	3.05	3.02	3.01	3.00	3.49	3.25	3.09	3.30	3.54	
7.5	3.78	3.76	3.70	3.64	3.57	3.52	3.46	3.41	3.37	3.32	3.29	3.27	3.24	3.23	3.70	3.47	3.31	3.52	3.77	
8.0	4.00	3.98	3.92	3.86	3.79	3.74	3.68	3.64	3.59	3.54	3.51	3.48	3.46	3.44	3.92	3.69	3.53	3.74	4.00	
8.5	0.23	0.20	0.14	0.08	0.01	1.95	1.90	1.85	1.81	1.76	1.73	1.69	1.67	1.65	0.14	1.91	1.74	1.96	0.23	
9.0	0.45	0.42	0.36	0.29	0.22	0.17	0.12	0.07	0.03	1.98	1.94	1.90	1.88	1.86	0.36	0.13	1.96	0.18	0.45	
9.5	0.67	0.64	0.57	0.50	0.44	0.38	0.33	0.28	0.24	0.19	0.15	0.11	0.08	0.06	0.58	0.34	0.16	0.39	0.68	
10.0	0.89	0.85	0.79	0.72	0.65	0.59	0.54	0.50	0.45	0.40	0.35	0.30	0.28	0.26	0.79	0.55	0.37	0.60	0.90	
10.5	1.10	1.07	1.00	0.93	0.86	0.80	0.75	0.70	0.66	0.60	0.55	0.50	0.47	0.45	1.00	0.76	0.57	0.81	1.11	
11.0	1.32	1.28	1.21	1.14	1.06	1.01	0.96	0.91	0.86	0.80	0.74	0.69	0.65	0.64	1.22	0.96	0.76	1.02	1.32	
11.5	1.53	1.49	1.42	1.34	1.27	1.21	1.16	1.11	1.06	0.99	0.92	0.87	0.84	0.82	1.43	1.17	0.95	1.22	1.53	
12.0	1.74	1.70	1.63	1.54	1.47	1.41	1.36	1.30	1.25	1.18	1.11	1.05	1.01	1.00	1.63	1.36	1.14	1.42	1.74	
12.5	1.96	1.91	1.83	1.75	1.67	1.61	1.55	1.49	1.44	1.36	1.28	1.23	1.18	1.17	1.84	1.56	1.32	1.62	1.94	
13.0	2.16	2.12	2.04	1.95	1.87	1.80	1.74	1.68	1.62	1.54	1.46	1.39	1.35	1.33	2.04	1.75	1.50	1.82	2.14	
13.5	2.37	2.32	2.24	2.14	2.06	1.99	1.92	1.86	1.80	1.71	1.62	1.56	1.51	1.49	2.24	1.93	1.67	2.01	2.34	
14.0	2.57	2.52	2.43	2.34	2.24	2.17	2.10	2.03	1.97	1.88	1.78	1.72	1.67	1.65	2.44	2.11	1.83	2.20	2.52	
14.5	2.77	2.72	2.63	2.52	2.43	2.34	2.27	2.20	2.14	2.04	1.94	1.87	1.82	1.80	2.63	2.29	1.99	2.38	2.71	
15.0	2.96	2.91	2.82	2.71	2.60	2.51	2.44	2.36	2.30	2.19	2.09	2.01	1.96	1.94	2.82	2.45	2.14	2.56	2.89	
15.5	3.15	3.10	3.01	2.89	2.77	2.68	2.60	2.52	2.45	2.34	2.24	2.15	2.10	2.08	3.01	2.62	2.29	2.73	3.07	
16.0	3.33	3.28	3.19	3.07	2.94	2.84	2.75	2.67	2.60	2.48	2.37	2.29	2.23	2.21	3.19	2.77	2.43	2.90	3.24	
16.5	3.51	3.46	3.37	3.24	3.10	2.99	2.90	2.81	2.74	2.61	2.50	2.42	2.36	2.34	3.37	2.92	2.56	3.07	3.40	
17.0	3.68	3.64	3.54	3.41	3.26	3.14	3.04	2.95	2.87	2.74	2.63	2.54	2.48	2.46	3.54	3.07	2.69	3.23	3.56	
17.5	3.85	3.81	3.71	3.57	3.41	3.28	3.17	3.08	3.00	2.86	2.75	2.66	2.60	2.57	3.70	3.20	2.81	3.39	3.71	
18.0	4.01	3.97	3.87	3.73	3.56	3.42	3.30	3.20	3.12	2.98	2.86	2.77	2.71	2.68	3.86	3.34	2.93	3.54	3.86	
18.5	4.16	4.12	4.03	3.88	3.70	3.55	3.42	3.32	3.23	3.08	2.97	2.88	2.82	2.79	4.02	3.46	3.04	3.68	4.00	
19.0	4.32	4.28	4.18	4.02	3.84	3.67	3.54	3.43	3.34	3.19	3.08	2.98	2.92	2.89	4.17	3.59	3.14	3.82	4.13	
19.5	4.46	4.42	4.32	4.16	3.97	3.79	3.65	3.53	3.44	3.29	3.17	3.07	3.01	2.98	4.31	3.70	3.24	3.96	4.26	
20.0	4.60	4.56	4.46	4.29	4.09	3.90	3.75	3.63	3.53	3.38	3.26	3.16	3.10	3.07	4.45	3.81	3.33	4.09	4.38	
20.5	4.74	4.69	4.59	4.42	4.21	4.01	3.85	3.72	3.62	3.46	3.34	3.25	3.18	3.15	4.58	3.91	3.42	4.21		
21.0	4.87	4.82	4.72	4.54	4.33	4.11	3.94	3.81	3.70	3.54	3.42	3.33	3.26	3.22	4.71	4.01	3.50	4.33		

Distribution of Intrinsic Brightness.—The range in intrinsic brightness among stars is enormous—at least twenty magnitudes, corresponding to an intensity ratio of 100 000 000 to 1. A knowledge of the frequencies of different luminosities among the stars in a given volume of space is essential (unless questionable assumptions are to be introduced) for the calculation of the space distribution of the stars. It is, however, difficult to obtain, and,

at present, the frequencies are but imperfectly known. By assuming that the mean parallaxes of stars of apparent magnitude m and proper motion μ can be represented by a linear function of m and $\log \mu$ supposed to be valid for all magnitudes and proper motions, Kapteyn and van Rhijn derived for the distribution of the absolute magnitudes a Gaussian error curve whose ordinates are given in the second column of Table 2. Seares ⁽⁴⁾ has shown

that their adopted mean parallax formula does not represent the distances of the stars of large motion and faint apparent magnitude, all of which are of low luminosity. A revision of the parallax formula, still only provisionally determined, and a recalculation of the luminosity function from about 500 stars of large proper motion leads to the frequencies in the third column of Table 2.

TABLE 2.—APPROXIMATE LUMINOSITY FUNCTION

$\phi(M)$ = number of stars, absolute magnitude M , per cubic parsec in the neighborhood of the sun. Unit of distance for M is 10 parsecs. 1 parsec = 3.26 light years = 30.8×10^{12} km.

M	10 + Log ₁₀ $\phi(M)$		Diff.
	Kapteyn v. Rhijn (3)	Seares (4)	
-4.64	2.61		
-3.64	3.42		
-2.64	4.17		
-1.64	4.85		
-0.64	5.46	5.58	0.12
+0.36	6.00	6.16	0.16
1.36	6.47	6.66	0.19
2.36	6.88	7.05	0.17
3.36	7.21	7.34	0.13
4.36	7.47	7.58	0.11
5.36	7.67	7.74	0.07
6.36	7.80	7.84	0.04
7.36	7.85	7.87	0.02
8.36	7.84	7.86	0.02
9.36	7.76	7.88	0.12
10.36	7.61	7.92	0.31
11.36	7.39	8.06	0.67
12.36	7.10	8.11	1.01
13.36	6.75	8.11	1.36
14.36	6.3	8.13	1.8

For the stars of low luminosity, the departure of Seares' curve from the error curve, shown by the differences in the fourth column, is important and must be accepted as real, although quantitatively the results are still very uncertain. The possibility of a maximum within the range of absolute magnitude considered is not excluded, but any such maximum must be well below the Kapteyn-van Rhijn limit, $M = 7.7$. Since the frequencies of stars of very low luminosity are still unknown, it is impossible at present to express the luminosity function as a true frequency function.

Space Distribution of Stars.—The space distribution is defined by a density function, preferably in a form expressing the total number of stars per unit volume at different distances from the sun. At present, however, we must be content with so expressing the number of stars which are brighter than some limit of absolute magnitude.

Analytically, the problem is to determine the density function, $\Delta(\rho)$, from the integral equation

$$\frac{dN_m}{dm} = \omega \int_0^\infty \phi(M) \Delta(\rho) \rho^2 d\rho$$

where the left hand member can be found from the data in Table 1; ω is a constant, ρ = distance from sun. Since $\phi(M)$, for $M > 8$, is still very uncertain, the general solution cannot be found at present. Values of the density for the neighborhood of the sun (Table 3) can, however, be calculated incidentally in deriving the data in Table 2. Results in the second column of Table 3 ($M = 7.86$) are in good agreement with similar results by Kapteyn and van Rhijn; the other tabular values indicate what is to be expected for lower limiting values of M . The uncertainty of the luminosity function for $M > 8$ scarcely justifies the effort required to complete the table.

TABLE 3.—AVERAGE NUMBER OF STARS, BRIGHTER THAN ABSOLUTE MAGNITUDE M , PER CUBIC PARSEC AT DISTANCE ρ FROM SUN (4)

Unit of ρ is 1 parsec; of distance for M , 10 parsecs. 1 parsec = 3.26 light years = 30.8×10^{12} km.

M	7.86	8.86	9.86	10.86	11.86	12.86	13.86	14.86
Log ₁₀ ϕ								
0.9	0.028	0.035	0.042	0.050	0.060	0.073	0.087	0.098
1.1	.026	.033	.040	.048	.058	.069	.078	
1.3	.024	.030	.035	.041				
1.5	.023	.028	.033					
1.7	.022							
1.9	.020							
2.1	.017							
2.3	.014							
2.5	.011							
2.7	.008							
2.9	.004							

(Values based upon $\phi(M)$ for stars near the sun, and on the assumption that the relative frequencies of M are the same at all distances.)

Average densities for the whole sky give a very imperfect picture of the real distribution in space, as the latter varies greatly with galactic latitude. Broadly speaking, the surfaces of equal space density are concentric, and approximately similar, ellipsoids of revolution, similarly situated, with axes in the ratio of about 5 to 1. See Table 4.

TABLE 4.—RADII OF EQUIDENSITY ELLIPSOIDS(6)

$\Delta(\rho)$ = number of stars per cubic parsec at distance ρ from sun. (Values require revision for recent star counts (Table 1) and for error in luminosity function (cf. Table 2)).

Unit of radius = 1 parsec. 1 parsec = 3.26 light years = 30.8×10^{12} km. Latitude is galactic.

$\Delta(\rho)$	Latitude	
	90°	0°
1.00	0	0
0.63	118	602
0.40	198	1010
0.25	296	1510
0.16	413	2106
0.100	553	2820
0.063	717	3656
0.040	902	4600

Size of the Galactic System.—At present we have no certain indication as to the distance of the most remote stars belonging to the galactic system; but if ordinary blue stars of absolute magnitude zero occur among the faintest objects listed in Table 1, the diameter of the system cannot be less than a million light years. Such objects are not to be expected in high galactic latitudes, where the stars of very faint apparent magnitude are almost certainly all dwarfs; but their occurrence in the Milky Way is by no means excluded. We have, indeed, strong, though not conclusive, evidence of the existence in the Milky Way of stars of zero absolute magnitude among those of the sixteenth apparent magnitude. The corresponding diameter of the system is a hundred thousand light years. This value may be accepted with some assurance as a lower limit for the size of the system in the plane of the Milky Way, exclusive of such objects as globular star clusters and spiral nebulae, whose relation to the general stellar system about us is not yet clearly defined.

Position of the Sun.—The symmetrical distribution of stars adopted in Table 1 tacitly assumes the sun to be at the center of the system. This is not actually the case, as is shown by systematic deviations from the adopted mean distribution. Shapley's (8)

value for the distance of the sun from the galactic plane is about 60 parsecs, to the north, which is certainly of the right order of magnitude. The sun's distance from the center is much less certain, and different estimates range from a few hundred to many thousand parsecs, according to the underlying assumptions and the method of attack. The question is much complicated by the fact that the sun lies within a local cluster whose members form a considerable fraction of the stars of the brighter apparent

magnitudes, and a final answer must await the detailed discussion of the distribution of faint stars in galactic longitude.

LITERATURE

(For a key to the periodicals see end of volume)

- (¹) Seares and van Rhijn, 197, 11: 358; 25; a more detailed account appears in *21*, 42: 320; 25. (²) *Trans. Internat. Astronomical Union*, 1: 69; 28. (Standard magnitudes of stars.) (³) Kapteyn and van Rhijn, *21*, 32: 23; 20. (⁴) Seares, *21*, 59: 310; 24. (⁵) Shapley, *21*, 49: 333, 19. (⁶) Kapteyn, *21*, 55: 302, 22.

DISTRIBUTION OF NEBULAE

FREDERICK H. SEARES

The term nebula is applied to objects of such diversity of form, size, distance, and physical characteristics that any study of their distribution presupposes a consideration of the question of classification. The following general classification by Hubble provides for two mutually exclusive divisions, characterized by position in the sky as well as by physical peculiarities, and five sub-classes representing physical differences.

A GENERAL CLASSIFICATION OF NEBULAE

I. Galactic nebulae, characterized by (1) tendency to concentrate about the Milky Way, (2) conspicuous association with individual stars from which they probably derive their luminosity, (3) early-type spectra, either emission or absorption, depending upon the spectral type of the associated stars, and (4) smooth and cloudy or wispy texture. They include

- (a) *Planetary*, distinguished by symmetrical distribution of nebulosity about central stars, sharply defined edges, and emission spectra.
- (b) *Diffuse nebulae*, clouds in low galactic latitudes, usually associated with early-type stars. This type ranges from luminous to dark and from semi-transparent to opaque. Subdivided into predominantly luminous, predominantly obscure, and conspicuously mixed.

II. Non-galactic nebulae, characterized by (1) tendency to avoid the Milky Way, (2) no conspicuous association with stars, (3) late-type absorption spectra, and (4) usually a rotational symmetry about dominating non-stellar nuclei. They include

- (a) *Elliptical nebulae*, amorphous objects whose forms can be represented as successive stages of an original globular mass flattening under the influence of increasing rotation.
- (b) *Spirals of two kinds, logarithmic and barred*, which, once formed, appear to develop along parallel lines, the arms unwinding and the granulation of the material becoming more and more conspicuous.
- (c) *Irregular nebulae*, including a few non-galactic objects having no dominating nuclei and, significantly, showing no rotational symmetry.

Physically, the planetaries and diffuse nebulae, Ia and Ib, are distinct and apparently without genetic relationship, except that the planetaries, which, in some cases at least, seem to be late stages in the development of novae, may represent the catastrophic consequences of the penetration of a star within a nebulous cloud of the diffuse sub-class. The spirals IIb, on the other hand, are apparently an evolutionary development from elliptical nebulae, IIa, although it does not follow that all elliptical nebulae will necessarily become spirals. The few irregular nebulae, IIc, present features that might be expected in the case of spirals in the absence of or through the neutralization of dominating dynamical characteristics.

The distribution of the various classes of nebulae is not in general easily shown in tabular form. The following summary for each of the important sub-classes includes, however, references to diagrams which exhibit the main features of the distribution.

Ia. Planetary Nebulae.—In the whole sky only about 150 of these objects are known, many of which are so small as to be recognizable only from their gaseous emission spectra. The smallest objects are closely associated with the Milky Way, and show a marked concentration in the Aquila-Sagittarius region. With increasing size the mean galactic latitude increases, and the largest known objects, to the extent of a dozen or so, are scattered over the sky with some approach to uniformity (3, 6, 11). This suggests that the linear distances of planetaries from the galactic plane are relatively small and that their angular diameters are correlated with their distances from the sun. Very small nebulae thus appear in low galactic latitudes because their distances from the sun are many times their distances from the galactic plane.

The actual distances of planetary nebulae are still very uncertain. Van Maanen (¹⁵) has measured the parallaxes of about 20 of these objects and finds distances ranging from 50 to a few hundred parsecs; but, as he points out, these values are in conflict with the fact that the radial velocities average about 30 km/sec, while the proper motions are apparently small, of the order of the parallaxes themselves.

Ib. Diffuse Nebulae.—The distant star clouds of the Milky Way define the galactic circle. A secondary galaxy, inclined some 12° to the galactic circle proper, is outlined by the bright helium stars of the much-flattened local cluster immediately surrounding the sun, most of whose members are within 500 parsecs (¹⁴). The diffuse nebulae outside the Magellanic Clouds, some hundreds in all,¹ are closely associated with the primary and secondary galactic circles (7). Since the mean galactic latitude of those following the primary galaxy is only about 2°, and since the space within the two circles is not well filled, the inference is that these nebulae are directly connected either with the Milky Way star clouds or with the local cluster, and that few are to be found in the intervening regions. We thus have a group of diffuse nebulae whose members are within a few hundred parsecs of the sun; the others, forming a widely scattered group associated with the Milky Way, are at distances probably to be counted in thousands of parsecs (¹⁰). Both groups include both luminous and dark nebulae; the luminous members of the two groups present somewhat different physical characteristics, most marked in their spectra, which may be either emission, or predominantly continuous or absorption in type. The continuous and absorption spectra occur mostly among the nearer objects connected with the local cluster. The luminous diffuse nebulae are conspicuously associated with stars of high temperature from which they derive their luminosity, either by excitation or reflection.

II. Non-galactic Nebulae.—The members of this class, consisting chiefly of the related sub-classes, elliptical nebulae (IIa) and spirals (IIb), are far more numerous than the galactic nebulae. On the whole, the elliptical nebulae outnumber the spirals many times; but if only bright objects are considered, the spirals are the more numerous. The distribution in galactic latitude is shown in

¹ Less than 200 luminous ones known; no complete list published (p. 7, 8). Most complete list of dark nebulae (182 small objects) is given by Barnard (⁹).

Table 1, which gives to limiting magnitude 18.6 on the international photographic scale the average number per square degree at various latitudes in each hemisphere. The data are compiled from Fath's list (4), based on Mount Wilson photographs (exposure time 1 hour with 60-inch reflector) of the 139 Selected Areas between the North Pole and declination -15° . That part of the northern galactic hemisphere within which nebulae are frequent is wholly covered. About one-half the southern hemisphere is included, but not the south pole itself. Fath's counts have been corrected for losses caused by poor definition in the corners of the negatives (13).

TABLE 1.—NON-GALACTIC NEBULAE: NUMBER PER SQUARE DEGREE (4)

Average number; international photographic magnitude ≤ 18.6 ; cf. Table 2.

Galactic latitude	Hemisphere	
	N	S
5°	0.2	0.0
15	0.8	0.4
25	2.5	5.4
35	13.2	8.2
45	10.3	5.8
55	12.2	7.0
65	22.2	11.9
74	31	
83	(68)	

Fath's list includes all classes of nebulae, but the galactic nebulae are relatively so infrequent that it is practically one of non-galactic nebulae alone. These objects begin to appear at about 20° latitude and increase rapidly in the interval 20° to 35° . From 40° to 70° the numbers increase slowly. The concentration near the north galactic pole is very pronounced. Below latitude 70° the numbers in the southern hemisphere average about three-fourths those of the northern. The assumption of a similar ratio for the regions 70° to 90° leads to integrated totals of 170 000 and 128 000 for the northern and southern hemispheres, a round total of 300 000 for the whole sky (limiting phot. mag. for stars 18.6).

The summary in Table 2 emphasizes the dependence of the distribution on galactic latitude. The uncertainty in the average number per square degree in the region 70° - 90° is considerable, and since the number of nebulae in this region is large (29% or 50 000 in the northern hemisphere), the total given for the whole sky is in doubt by many thousand. Curtis (2) has estimated the total (to an undetermined limiting magnitude) to be over 700 000. The difference in the estimates may arise from a difference in magnitude limits or from the fact that the fields counted by Curtis are not certainly representative of the sky as a whole.

TABLE 2.—DISTRIBUTION OF NON-GALACTIC NEBULAE

Lat. = interval in galactic latitude. Sky = % area of sky. Neb. = % number of nebulae. N = northern, S = southern hemisphere.

Lat.	Sky	Neb.	
		N	S
0°-30°	50	7	15
30-70	44	64	56
70-90	6	29	29

The distribution of non-galactic nebulae is not, however, simply one of galactic latitude. Data collected by Hardeastle and Hinks (5) and by Reynolds (12) show marked irregularities in longitude, which seem to depend on the angular diameters of the nebulae. Thus objects with diameters $> 10'$ are almost all in the hemisphere including galactic longitudes 50° to 230° . For diameters $5'$ to $10'$ the northern galactic hemisphere shows high frequencies in longitude 110° and 200° - 270° , which become even more marked for diameters $2'$ to $5'$. For still smaller nebulae, the distribution is again different. Fath's counts, including mostly very small and faint nebulae, show a band of high frequency crossing the northern galactic hemisphere approximately in longitudes 50° and 220° , with other irregularities suggesting a very complicated distribution.

Nothing is known directly of the distances of elliptical nebulae, but their relationship with the spirals is so intimate that the distances of the two sub-classes must be regarded as of the same order. Van Maanen's measures (14) of internal motion in spirals suggest distances of the order of 3000 to 30 000 light years. The application of Shapley's period-luminosity relation by Hubble (9) to numerous typical Cepheid variables discovered by him in the spirals Messier 31 (the Andromeda nebula) and Messier 33 leads to distances of about a million light years for these two objects. The applicability of the period-luminosity relation is assumed, but several lines of corroborative evidence strongly support the larger value of the distance. It is probable, however, that the zero point of the period-luminosity relation requires revision by an amount which would reduce these distances by about 40%.

LITERATURE

(For a key to the periodicals see end of volume.)

- (1) Barnard, *21*, 49: 1, 19 (also consult index of other volumes). (2) Curtis, *Publ. Lick Obs.* 13: 15; 18. (3) Curtis, *Ibid.*, 13: 60, 18. (4) Fath, *Astronom. Jour.* 58: 75, 14. (5) Hardeastle and Hinks, *Monthly Notices, R. A. S.* 74: 699, 14. (6) Hinks, *Ibid.*, 71, 691; 11. (7) Hubble, *21*, 56: 162; 22. (8) Hubble, *21*, 56: 400, 22. (9) Hubble, *Pop. Astronomy* 33: 252; 25. *Observatory* 48: 139, 25. (10) Landmark, *Publ. Astron. Soc. Pacific*, 34: 40; 22. (11) Perrine, *21*, 46: 177, 17. (12) Reynolds, *Monthly Notices, R. A. S.* 81: 129, 20. 83: 147; 23. 84: 76, 23. (13) Seares, *21*, 62: 108, 25. (14) Shapley, *21*, 49: 311; 19. (15) van Maanen, *Mt. Wilson Contrib. No.* 237 (1922), 270 (1923), 280 (1925). (16) van Maanen, *21*, 67: 274; 23.

MOTIONS OF THE STARS AND NEBULAE

GUSTAF STRÖMBERG

The proper motion of a star is defined as the angular motion, per year, referred to a certain fundamental system of apparently bright stars distributed uniformly over the sky. The radial motion is determined by the Doppler shift for spectral lines of known wave-length. If the distance to a star is known, the three velocity-components of its space-velocity can be determined. Proper motions and radial velocities are in general referred to the sun as origin, by correction for the periodic changes due to the earth's motion. The proper motions are in general very small; for the majority of the stars they are below $0.1''$ per year. The largest proper motion is that of Barnard's star R. A. 17^h

53 0^m, Dec. $+4^\circ 28'$, (1900 0), which moves $10.27''$ per year. The radial velocities are mostly below 40 km/sec, the largest being that of the variable star V X Herculis, which approaches the sun with a velocity of 390 km/sec. The spiral nebulae have even higher velocities, the highest being 1800 km/sec, recession, (N. G. C. 584).

SOLAR MOTION

The sun's motion relative to the stars can be determined either from proper motions, from radial velocities, or from space-velocities. The point in the sky towards which the sun is moving is called the sun's apex.

TABLE 1.—SOLAR APEx AND THE SUN'S VELOCITY
(Referred to apparently bright stars. Unit: velocity, km/sec)

R. A. 1900	Dec. 1900	Velocity	Method	No. of stars	Lit.
18 ^h 03 ^m	+34.3°		Proper Motions P. G. C.*	5413	(2)
18 11	+31.6		Proper Motions $m < 6.0$ †	4041	(8)
17 56	+32.3		Proper Motions P. G. C.	5943	(8)
17 54	+25.3	19.5	Rad. Vel. Lick Obs.	1193	(2)
18 2	+28.6	19.8	Rad. Vel. B to M	1596	(6)
18 4	+29.2	21.5	Rad. Vel. F to M	1405	(9)
18 11	+36.9	18.8	Space Vel. Giants	800	(10)
18 43	+29.5	31.7	Space Vel. Dwarfs	415	(10)
18 40	+32	29	Space Vel. of nearby stars	83	(7)

* Preliminary General Catalogue by I. Bode, Washington, 1910

† Stars brighter than the 6th magnitude (apparent).

Although the agreement between the different determinations is fairly good, a detailed study shows that the sun's motion can not be regarded as a constant vector. The A stars and giant stars in general give a small velocity for the sun; and dwarf stars, a much higher velocity.

AVERAGE PECULIAR MOTIONS OF THE STARS

After the effect of the sun's motion has been removed, the residual or "peculiar" velocities show certain regularities. The average peculiar velocities are different for stars of different spectral types, and vary also with the intrinsic brightness of the stars.

TABLE 2.—AVERAGE RESIDUAL RADIAL VELOCITIES (θ) OF STARS OF DIFFERENT SPECTRAL CLASSES (Sp) AND ABSOLUTE MAGNITUDES (M)

Unit of θ = 1 km/sec							
Sp	M*	θ	Lit.	Sp	M*	θ	Lit.
O5 to O9	-3	20.7	(11)	K	+1	18.4	(1)
B	-1	6.5	(3)	K	+6	27.0	(1)
A	+1	11.0	(11)	M	+1	21.6	(1)
F	+2	15.8	(1)	M	+9	29.6	(11)
G	+1	18.0	(1)	Me†	0	40.1	(11)
G	+5	28.3	(1)	P‡	-	28.6	(11)

* The apparent magnitude as observed from a distance of 10 parsecs

† Contains M stars with bright hydrogen-lines, all are variable stars of long period.

‡ Bright-line nebulae.

PREFERENTIAL MOTION

The peculiar velocities of the stars are not distributed at random. In general the stars show a tendency to move parallel to the galactic plane. To describe the distribution of the peculiar velocities, a distribution-function is adopted, which gives the relative numbers of stars moving in different directions and with different velocities. The simplest distribution-function is the spherical distribution-law,

$$F(xyz) = \frac{N}{(2\pi)^{\frac{3}{2}} \sigma^3} e^{-\frac{x^2 + y^2 + z^2}{2\sigma^2}}$$

where x , y , and z are the velocity-components referred to the "centroid" of the group. N is the number of stars in the group, and σ is the dispersion or the square-root of the mean of the squares of the velocity-components. The number of stars of velocity-components between $x \pm \frac{1}{2}dx$, $y \pm \frac{1}{2}dy$, $z \pm \frac{1}{2}dz$ is then given by $F(xyz) dx dy dz$. In a spherical distribution, the frequency of a velocity is independent of its direction and only dependent upon its size. Spherical velocity-distributions occur for several classes of stars, but in general the distribution in

velocity-space is either flattened (B stars) or elongated (A, F, and dwarf stars). Two functions have been used to describe the elongated distribution. Kapteyn and Eddington have used a sum of two spherical functions and have regarded the stars as belonging to two intermingled systems, "two stream hypothesis." Schwarzschild has introduced the ellipsoidal distribution defined by the distribution-function

$$F(xyz) = \frac{N}{(2\pi)^{\frac{3}{2}} abc} e^{-\left(\frac{x^2}{2a^2} + \frac{y^2}{2b^2} + \frac{z^2}{2c^2}\right)}$$

with three principal dispersions a , b , and c , which define the three axes of the "velocity-ellipsoid." The velocity-components x , y , and z are here projected on the principal axes of this ellipsoid. The major axis of the velocity-ellipsoid corresponds to the line joining the two centers in the two stream theory. The direction of this fundamental axis, which is common in the two theories, is about R. A. 6^h 6^m, Dec. +9°, (true vertex). The dwarf stars give a somewhat higher declination for the true vertex.

In the analysis of proper motions, the two stream theory gives two vertices, which correspond to the directions of motion of the two streams relative to the sun. The coordinates of these vertices are R. A. 6^h 14^m, Dec. -13° (first stream) and R. A. 19^h 16^m, Dec. -60° (second stream).

Analyzing stellar motions on the basis of the two stream theory, we find a number of stars which cannot be regarded as belonging to either of the two streams. The B stars and stars of spectral class M, for instance, have a group-motion intermediate between the two streams. For this reason Halm has introduced a third stream (0 stream). But these streams taken together can be fairly well represented by an ellipsoidal distribution using a smaller number of parameters.

Charlier (4) has introduced a generalization of the ellipsoidal theory which makes it possible to take into account deviations from a strictly ellipsoidal distribution, but it is only when these deviations are small that this generalization is practicable.

MOVING CLUSTERS OR GROUPS

Several stars move nearly parallel to one another, the best known example being 5 of the 7 bright stars in the constellation Ursa Major. Another moving group or cluster is the Hyades in the constellation Taurus (Taurus Group). The proper motions of the stars belonging to such a group converge towards a point in the sky, the "convergent point," whose position in the sky gives the direction of motion of the group relative to the sun. The convergent point for 17 stars belonging to the Ursa Major Group is R. A. 20^h 30^m, Dec. -40°; for the Taurus Group (39 stars) R. A. 6^h 7^m, Dec. +7°. A number of other moving groups are known.

THE GENERAL DISTRIBUTION OF COSMIC VELOCITIES

When the sun's motion is referred to different classes of objects it has been found that this motion is not a constant vector but varies greatly, from about 12 km/sec for the A stars and the Cepheids of long period up to 300 km/sec for the fast moving objects, the globular clusters and the spiral nebulae. A general relationship between group-motion and dispersion exists, which, according to Strömberg (11), holds for all classes of objects, but with a small deviation for the B star system. This variation in group-motion produces an asymmetry in the velocity distribution, in such a way that all fast moving objects move, relative to the sun, towards the same hemisphere. This asymmetry defines an axis along which the group-motion increases with increasing internal velocity-dispersion. The direction of this axis is R. A. 8^h 39^m, Dec. -57°, and the motion of objects with small velocity-dispersion relative to those of high velocity-dispersion is about 300 km/sec in the opposite direction. The group-motion of objects

with high velocity-dispersion is approximately the same as that of the globular clusters and spiral nebulae.

The general distribution of cosmic velocities can be approximately represented by a product of two symmetrical distributions S_1 and S_2 . The first of these is a sum of concentric and co-axial ellipsoidal distributions, the velocity of the sun relative to the center of the distribution S_1 being 14.8 km/sec in the direction R. A. $17^h 43^m$, Dec. $+22^\circ$. The sun's motion relative to the second distribution, S_2 , is 300 km/sec in the direction R. A. $20^h 28^m$, Dec. $+56^\circ$. The first distribution can be regarded as the velocity-distribution in our local system of stars, the second as a

velocity-restriction in a universal world-frame of enormous dimensions. Other interpretations, however, may be possible.

LITERATURE

(For a key to the periodicals see end of volume)

- (¹) Adams, *Strömberg and Joy*, #1, 84: 9; 21. (²) Boss, 320, 20: 111; 10. (³) Campbell, *Lick Obs. Bull.*, No. 196; 11. (⁴) Charlier, *Lund Observatorium, Meddelanden*, II: No. 13; 15. (⁵) Charlier and Wicksell, *Ibid.*, II: No. 12: 45, 15. (⁶) Gyllenberg, *Ibid.*, II: No. 13; 15. (⁷) Luyten, *Annals Harvard College Obs.*, 88: No. 5; 23. (⁸) Raymond, 320, 20: 101; 17. (⁹) Strömberg, #1, 47: 7, 18. (¹⁰) Strömberg, #1, 86: 265; 22. (¹¹) Strömberg, #1, 81: 363; 25.

TIME

CHRONOLOGICAL ERAS
Gregorian Calendar

Era	Year	Begins, 1925 A. D.
Byzantine†	7434	September 14
Diocletian†	1642	September 11
Grecian*†	2237	September 14
		October 14
Hegira.....	1344‡	July 21
Japanese.....	2585‡	January 1
Jewish.....	5686‡	September 18
Julian calendar.....	1925	January 14
Julian period.....	6638§	January 14
Mohammedan.....	1344‡	July 21
Nabonassar†	2074	May 12
Rome†	2878||	January 14
Seleucidae†	2237	(See Grecian)

* In present-day usage of Syrians, begins in September or October depending upon the sect. In ancient usage of Damascus and Arabia Petraea, began with vernal equinox.

† The 14th year of period Taisho.

‡ Begins at sunset.

§ Julian day number of January 1, 1925 (Gregorian) is 2 424 152

|| Since foundation of Rome, according to Varro

¶ Based upon Julian calendar.

TIME

Interval	Days*
Year:	
Tropical†.....	365 2422
Sidereal.....	365 2564
Anomalistic.....	365 2596
Month:	
Synodical†.....	29 530 59
Tropical.....	27 321 58
Sidereal.....	27 321 66
Day:	
Sidereal.....	0 997 2696

* Mean solar days.

† Ordinary

EQUATION OF TIME*

(Δ = mean — apparent)

Unit of Δ is minute. Time is Greenwich mean noon

Date	Δ	Date	Δ	Date	Δ
I 1	+ 3 4	V 11	-3 8	IX 18	- 5.6
6	5.8	16	-3 8	23	- 7.3
11	7 8	21	-3 7	28	- 9.0
16	9 7	26	-3.3	X 3	-10.7
21	11 3	31	-2 6	8	-12.2
26	12 6	VI 5	-1.8	13	-13.5
31	13 6	10	-1 0	18	-14.6
II 5	14 1	15	0 0	23	-15.5
10	14 4	20	+1.1	28	-16.1
15	14 3	25	2.2	XI 2	-16.3
20	14 0	30	3.2	7	-16.3
25	13 3	VII 5	4.2	12	-15.9
III 2	12 4	10	5.0	17	-15.1
7	11.4	15	5.6	22	-14.0
12	10 0	20	6.1	27	-12.5
17	8 7	25	6.3	XII 2	-10.7
22	7 2	30	6.3	7	- 8.8
27	5.7	VIII 4	6.0	12	- 6.5
IV 1	4 2	9	5.4	17	- 4.1
6	2.7	14	4.7	22	- 1.6
11	1 2	19	3.7	27	+ 0.9
16	+ 0 0	24	2.5	31	+ 2.8
21	- 1 2	29	+1 1		
26	- 2 2	IX 3	-0 4		
V 1	- 2 9	8	-2.1		
6	- 3 4	13	-3.8		

* Δ is the amount by which mean time exceeds apparent time when it is noon at Greenwich, it is the excess of the right ascension of the actual sun over that of the mean sun at that instant. It varies continuously with the time, and does not exactly repeat its values in successive years; those given are average values for Greenwich mean noon of an ordinary year, and will seldom differ from the actual values for that time by as much as 0.2 min., except in January and December, when the difference may amount to 0.3 min. In leap years, all dates in the table after February must be reduced by one day.

SOLAR SYSTEM

ORBITAL DATA; SOLAR SYSTEM (1925)

Units: Distance, 10^4 km; period, tropical year

Planet	Distance*	Eccentricity	Inclination†	Mean longitude		Sidereal period
				Node‡	Perihelion	
☿ Mercury	57.9	0.2056	7° 0' 12.0"	47° 26' 32.1"	76° 17' 18.9"	0.24085
♀ Venus	108.1	0.0068	3 23 38.0	76 0 16.7	130 30 56.8	0.61521
⊕ Earth	149.5	0.01674			101 39 2.3	1.00004
♂ Mars	227.8	0.0933	1 51 0.6	48 58 45.0	334 40 42.2	1.88089
♃ Jupiter	778	0.0484	1 18 26.4	99 41 26.3	13 6 51.4	11.862
♄ Saturn	1426	0.0558	2 29 28.7	113 0 5.7	91 34 42.0	29.458
♅ Uranus	2869	0.0471	0 46 22.1	73 36 57.7	169 26 56.8	84.015
♆ Neptune	4196	0.00855	1 46 36.7	130 57 13.3	43 58 27.9	164.788

* Mean distance

† Angle between plane of orbit and plane of ecliptic

‡ Ascending node

CHARACTERISTICS OF MEMBERS OF SOLAR SYSTEM

Units: Linear diameter, 1000 km; density, g/cm³; time, mean solar

Name	Diameter		Mass† × 10 ³⁰ Mass sun	Density	Sidereal rotation	Number satellites
	Linear	Angular*				
Mercury	4.84	10.90"	0.1670	5.6		0
Venus	12.19	1' 0.80	2.451	5.1		0
Earth	12.76‡		3.036‡	5.52	23 hr 56.07 min	1
Mars	6.78	17.88	0.3233	3.9	24 37.4	0
Jupiter	112.7‡	46.86‡	954.8	1.4	9.8 hr	7
Saturn	120.8‡	19.52‡	285.6	0.7	10.2 hr	9
Uranus	19.7	3.76	43.7	1.3+		4
Neptune	53.0	2.52	50.8	1.3		1
Sun||	1391	31.59 26	1.001 341	1.4	25.3 da	
Moon	3.48	31.5 16¶	0.037**	3.3	27.32 da	

* At distance = difference mean distance sun to object and mean distance sun to Earth, nearly at distance of nearest approach to Earth.

† Includes satellite (or planetary) system, if any

‡ Mass of Earth alone = 2.989×10^{-30} mass of sun

§ Equatorial diameter Polar diameter Earth = 12.71, Jupiter = 133.2, 43.74", Saturn = 108.1, 17.46" Diameter of sphere of volume = Earth, is 12.74

|| At mean distance of Earth, gravitational acceleration due to Sun is $k^2 = 2.9592 \times 10^{-4}$ (mean distance) per day² = 0.5926 cm per sec². For solar spectrum etc, see index

¶ At mean distance from Earth. Apparent diameter varies, with distance, from 29.5' to 33.5'

** Moon alone. Mass Moon = 0.01227 mass Earth

SOLAR DATA

Inclination of equator to ecliptic, about	7°
Longitude of ascending node of equator	74.5°
Period of rotation, about	28 da*
Sun spot period, about	11 yr

Constant of notation.	9.21"
Constant of aberration	20.47"
Solar parallax	8.80"

From parallax measurements	8.806"
From velocity of light	8.781
From mass of Earth.	8.762
From motion of Moon	8.773

Equatorial horizontal parallax of Moon* 57' 2.70" (Brown)

Mean distance Earth to Moon, 384 403 km

Inclination of Moon's equator to ecliptic 1° 32.1"

Inclination of Moon's orbit to ecliptic, about 5°

Eccentricity of Moon's orbit (average) 0.055

Revolution of Moon's nodes (retrograde) 18.6 yr

* Mean of greatest and least values; actual values vary from 53' to 61' ca.

TERRESTRIAL AND LUNAR DATA†

General precession (retro-

grade) 50 2564" + 0.000222"(t - 1900) per yr

Obliquity of the ecliptic 23° 27' 8.26" - 0.1684"(t - 1900)

* From observations of sun spots near latitude 45°, spots near equator rotate in about 24 da; those near lat. 80°, in 30 da

† For geodetic and geophysical data, see p. 393.

COMPOSITION OF THE ATMOSPHERE

W. J. HUMPHREYS

TABLE 1.—COMPOSITION OF DRY AIR AT SEA-LEVEL (4, 5)

v = volume of the gas in volume V of dry air

Gas	N ₂	O ₂	A	CO ₂	H ₂ ^a	Ne	He	Kr	Xe
100v/V	7803	2099	94	3	1	0.123	0.04	0.005	0.0003

^a Values found by analysis vary; the one here given is that accepted by Hann and the *Recueil de Constantes Physiques*.

TABLE 2.—COMPOSITION OF ATMOSPHERE AT VARIOUS LEVELS

Computed from data of Table 1 on the assumptions: (1) at surface, H₂O vapor supplies 1.2% of the total number of gas molecules, (2) absolute humidity decreases rapidly to a negligible amount at about 10 km, (3) temperature = 11°C at sea-level, decreases normally (6°C per km) to -55°C at 11 km, remains constant above 11 km, (4) relative proportions of the gases, water vapor excepted, remains constant up to 11 km, (5) above 11 km, distribution is in accordance with their molecular weights (3). The amount of H₂ is in doubt (see note Table 1), especially above 11 km; it may become oxidized to H₂O before reaching the upper atmosphere.

v = volume of the gas contained in volume V of atmosphere. Unit of height = 1 km = 0.621 mi.; of pressure = 1 mm of Hg

Height	100v/V							Total pressure
	N ₂	O ₂	H ₂ O	A	CO ₂	H ₂	He	
140	0.01					99.15	0.84	0.0010
130	0.04					99.00	0.96	0.0046
120	0.19					98.74	1.07	0.0052
110	0.67	0.02	0.02			98.10	1.19	0.0059
100	2.95	0.11	0.05			95.58	1.31	0.0067
90	9.78	0.49	0.10			88.28	1.35	0.0081

Height	100v/V							Total pressure
	N ₂	O ₂	H ₂ O	A	CO ₂	H ₂	He	
80	32.18	1.85	0.17			64.70	1.10	0.0123
70	61.83	4.72	0.20	0.03		32.61	0.61	0.0274
60	81.22	7.69	0.15	0.03		10.68	0.23	0.0635
50	86.78	10.17	0.10	0.12		2.70	0.07	0.403
40	86.12	12.61	0.06	0.22		0.67	0.02	1.84
30	81.26	15.18	0.03	0.35	0.01	0.16	0.01	8.63
20	81.24	18.10	0.02	0.59	0.01	0.04		40.99
15	79.52	19.66	0.01	0.77	0.02	0.02		89.66
11	78.02	20.99	0.01	0.94	0.03	0.01		168.00
5	77.89	20.95	0.18	0.94	0.03	0.01		405.
0	77.08	20.75	1.20	0.93	0.03	0.01		760.

TABLE 3—MASSES OF THE ATMOSPHERE AND ITS CONSTITUENTS

Based upon Table 1, the assumptions of Table 2, and the assumption that the average atmospheric pressure at the surface of the earth = 737 cm and at base of stratosphere = 14.5 cm (1, 2). Area of earth is taken as 51×10^{10} cm².

Total mass $M = m \times 10^6$ kg; 1000 kg = 1.102 tons (of 2000 lb.)

Gas	All	N ₂	O ₂	A	H ₂ O	CO ₂	H ₂	Ne	Kr	He	Xe
m	511	387	116	624	133	217	129	471	64	63	116
n	16	16	16	14	14	13	12	11	11	11	10

LITERATURE

(For a key to the periodicals see end of volume)

- (1) Hann, *Lehrbuch der Meteorologie* (3rd ed.) (2) Humphreys, *Monthly Weather Review*, 49: 311, 21 (3) Humphreys, *Physics of the Air*, p. 69; 20. (4) Ramsay, *S*, 80: 599; 08 (5) Various authorities

MISCELLANEOUS GEODETTIC DATA

W. D. LAMBERT

With certain exceptions which are especially noted, those of the following data which depend upon the dimensions of the earth have been calculated strictly in accordance with the INTERNATIONAL ELLIPSOID OF REFERENCE, adopted by the Section of Geodesy of the International Geodetic and Geophysical Union, meeting at Madrid, October 6 and 7, 1921. This ellipsoid is based upon the results obtained by J. F. Hayford (Supplementary Investigation in 1909 of the Figure of the Earth and Isostasy, Washington, 1910), but is not absolutely identical with Hayford's ellipsoid. (For some of the other spheroids that are used for geographical purposes, see Special Publication #100, U. S. Coast and Geodetic Survey. Recent attempts have been made to show that the actual figure of the earth can be represented more closely by an ellipsoid of three unequal axes, than by one of revolution, systematic departures from the latter being of the order of 100 to 200 meters in elevation and depression.)

If the positions of the two ends of a line are determined geodetically for any assumed spheroid of reference, the uncertainty in the length of the line as measured along the earth depends almost entirely upon the errors in the survey; for geodetic surveys of the highest class, the uncertainty is a little less than one in 100 000 and for an ordinary fair survey it is about four times as great. The proportional error in the straight-line distance is greater, mainly because the geoid does not coincide with the ellipsoid; these additional errors are not serious for a short line, but for two points almost diametrically opposite may amount to 100 or 200 meters.

If the end points are determined astronomically, the principal error in the computed length is due to the difference in the deflection of the plumb-line at the two points; unless the measured line is short, the average uncertainty so introduced is of the order of 200 meters, but may be much more, especially in rugged country.

Latitude.—The latitude of a place is defined as the angle which some line of reference makes with the equatorial plane. Four lines of reference, defining four distinct kinds of latitude, are used. Three of these lines pass through the place considered; viz., (1) The plumb-line, defining the *astronomical* latitude, (2) the normal to the spheroid of reference, defining the *geographical* latitude, and (3) the line to the center of the earth, defining the *geocentric* latitude. The fourth line of reference passes through the center of the earth and that point which is upon the circumscribed sphere (radius = equatorial radius of the spheroid) and at the same distance from the axis of rotation as is the point on the spheroid representing the place considered; this defines the *parametric*, or *reduced*, latitude.

Gravity.—If the earth's sea-level surface were accurately represented by the International Ellipsoid of Reference, and if no attracting matter projected above this surface, then the variation of gravity at sea-level (γ_0) would be represented by the equations

$$\begin{aligned}\gamma_0 &= \gamma_e(1 + 0.005\,288 \sin^2\phi - 0.000\,006 \sin^2 2\phi) \\ &= \gamma_{45}(1 - 0.002\,637 \cos 2\phi + 0.000\,006 \cos^2 2\phi)\end{aligned}$$

¹ The resultant acceleration arising from the gravitational attraction and the rotation of the earth.

where φ is the geographic latitude, and γ_e, γ_{45} are the values of γ at the equator and at latitude 45° , respectively. These equations differ slightly from that used in computing the table on p. 396; the latter corresponds to an ellipticity of $1/297.4$.

TABLE 1.—FORM AND SIZE OF THE EARTH

Based upon International Ellipsoid of Reference; accepted constants, from which the others are computed, are $a = 6\,378\,388$ meters, ellipticity $[=(a-b)/a] = 1/297$. The indicated uncertainties are estimates, by Lambert, based upon a consideration of systematic errors as well as of internal discordances.

a = semi-major axis	.....	$= 6\,378\,388 (\pm 60)$ m
b = semi-minor axis	.....	$= 6\,356\,911\,946$ m
Radius of sphere of same area	.....	$= 6\,371\,227.7$ m
Radius of sphere of same volume	.....	$= 6\,371\,221.3$ m
Length of equatorial quadrant	.....	$= 10\,019\,148.4$ m
Length of meridional quadrant	.....	$= 10\,002\,288.3$ m
f = ellipticity $= \left(\frac{a-b}{a}\right)$	.....	$= 0.003\,367\,0031$
$\frac{1}{f}$ = reciprocal of ellipticity	.....	$= 297.0 (\pm 0.4)$
e^2 = (eccentricity) $^2 = f^2 \left(\frac{2}{f} - 1\right) = \frac{a^2 - b^2}{a^2}$	.....	$= 0.006\,722\,0700$
Area of the ellipsoid	.....	$= 510\,100\,931$ km 2
Land area	.....	$= 148\,847\,000$ km 2
Ocean area	.....	$= 361\,254\,000$ km 2
Volume of the ellipsoid	.....	$= 1\,083\,319.78 < 10^9$ km 3
Mass of the ellipsoid* ($d = 5.527$ g/cm 3 , p. 395)	.....	$= 5.988 \times 10^{24}$ kg
Principal moments of inertia ($A = B < C$)†	.....
$A \ddagger = B \ddagger$	.....	$= 0.332\,35$ Ea 2
$C \ddagger$	.....	$= 0.333\,44$ Ea 2
$C - A$	.....	$= 0.001\,0921$ Ea 2
$\left(\frac{C-A}{C}\right) = \left(\frac{1}{305.12}\right)$	.....	$= 0.003\,2774$

* For discussion of variation of density with depth below surface, see Adams and Williamson, Smithsonian Annual Report, 1923, p. 211.

† E = mass of earth.

‡ Computed values vary but little with any admissible assumption regarding the constitution of the interior of the earth. Values are based upon computations of De Sitter (*Rev. Astr. Soc.*, 27: 233, 21); ellipticity taken as $1/296.92$.

§ Deduced from precession of equinoxes, involves no hypothesis regarding constitution of interior of earth.

TABLE 2.—DISTANCES UPON SURFACE OF THE INTERNATIONAL ELLIPSOID OF REFERENCE

M = length of meridian from equator to geographic latitude φ ;
 S_m = length of meridian from latitude $(\varphi - \frac{1}{2}\Delta\varphi)$ to $(\varphi + \frac{1}{2}\Delta\varphi)$;
 S_p = length of arc of parallel for 1° of longitude at latitude φ .
 These may be computed by means of the equations: $M = a\varphi - b \sin 2\varphi + c \sin 4\varphi - d \sin 6\varphi$; $S_m = a\Delta\varphi - b \sin \Delta\varphi \cos 2\varphi + c \sin 2\Delta\varphi \cos 4\varphi - d \sin 3\Delta\varphi \cos 6\varphi$; S_p (for $\Delta\varphi = 1^\circ$) $= a - b \cos 2\varphi + c \cos 4\varphi - d \cos 6\varphi$; $S_p = a \cos \varphi - b \cos 3\varphi + c \cos 5\varphi$; where the coefficients and their logarithms have the following values:

Unit of length = 1 meter; of angle = 1°

	M^*		S_m^*	
	Value	log $_{10}$	Value	log $_{10}$
a	111 136.537	5.045 856 86	111 136.537	5.045 856 86
b	16 107.035	4.207 015 6	32 214.069	4.508 045 6
c	16.976	1.229 84	33.952	1.530 87
d	0.022	2.348	0.045	2.649

	S_m^* for $\Delta\varphi = 1^\circ$		S_p^*	
	Value	log $_{10}$	Value	log $_{10}$
a	111 136.537	5.045 856 86	111 417.657	5.046 954 02
b	562.213	2.749 901	93.904	1.972 686
c	1.185	0.073 7	0.119	1.074 6
d	0.002	3.37		

* Owing to uncertainty regarding the actual size of the earth, actual distances upon the earth at sea-level may differ from these computed distances by about 2 in 100 000 near the equator or the poles, by somewhat less in middle latitudes.

TABLE 3.—EXCESS OF GEOGRAPHIC LATITUDE (φ) OVER GEOCENTRIC (φ') AND PARAMETRIC (θ) LATITUDES

$$\begin{aligned}\varphi - \varphi' &= a \sin 2\varphi' - b \sin 4\varphi' + c \sin 6\varphi' \\ &= a \sin 2\varphi' + b \sin 4\varphi' + c \sin 6\varphi' \\ \varphi - \theta &= a' \sin 2\varphi - b' \sin 4\varphi + c' \sin 6\varphi \\ &= a' \sin 2\theta + b' \sin 4\theta + c' \sin 6\theta\end{aligned}$$

where the coefficients and their logarithms have the following values:

Unit of coefficients = $1''$

	Value		Value	
	Value	log $_{10}$	Value	log $_{10}$
a	695 6635	2.842 3992	a'	347 8327
b	1.1731	0.069 34	b'	0.2933
c	0.0026	3.421	c'	0.0003

TABLE 4.—MISCELLANEOUS TERRESTRIAL DATA

Angular velocity of rotation	$72\,921 \times 10^{-4}$ radians/sec*
Rotational energy	$2\,160 \times 10^{24}$ ergs
Rotational energy lost by tidal friction	1.1×10^{19} ergs/sec†
Work required to dissipate the material of the earth to infinity	2.46×10^{29} ergs
Mean elevation of land above sea-level	825 m
Mean depth of the oceans	3681 m
Mean effective viscosity is not known, but perhaps between	10^{20} and 10^{21} poises‡

* Mean solar second.

† Jeffreys, *ibid.*, 221A: 239, 20; *The Earth, Its Origin, History and Physical Constitution*, 205-237; 24. Heiskanen, 175, 18A: 1; 21.

‡ Schweydar, *Veröffentl. des Preuss. Geodät. Inst.*, No. 79; 19; Jeffreys, *Monthly Notices, Roy. Astr. Soc.*, 78: 648; 15. 76: 84, 16. 77: 449, 17; also *The Earth, its Origin, History, and Physical Constitution*, 222, 1924.

Rigidity (μ). From the yielding of the solid portions (revealed by observations with horizontal pendulums), and on assumption of incompressibility, Schweydar (Zentralbureau Int. Erdmes., Neue Folge No. 38, 1921) deduces $\mu = 30.8 (1 - 0.00r^2/a^2) \times 10^{11}$ dynes/cm 2 , and mean effective rigidity = 17.6×10^{11} dynes/cm 2 (r = distance from center, a = mean radius). To allow for compressibility, these values must be increased by about 20% (Lambert, preliminary, unpublished computations); even then the value computed for the outer shell of half-radius thickness is much less than that deduced from earthquake data. (See Adams and Williamson, Smithsonian Annual Report, 1923.) The discrepancy may arise from Schweydar's assumption of high rigidity in the central portions, which may possibly behave as a fluid. (See Knott, *ibid.*, 39: 157; 19; Sieberg, *Geologische, physikalische und angewandte Erdbebenkunde*, 364; 23.)

GRAVITY DATA

CLARENCE H. SWICK

This section includes: (A) The value of the gravitation constant; (B) the absolute determination upon which the tabulated values of the acceleration of gravity¹ rest; (C) values of the acceleration of gravity (g) at numerous stations well distributed over the surface of the earth, together with a table giving the values of g at sea-level and at various latitudes; and (D) means for computing the variation in g with the distance of the station above, or below, either the surface of the earth or sea-level. In preparing the data, valuable assistance was received from several colleagues. In particular should be mentioned Mr. W. D. Lambert's assistance with section D, and Miss Sarah Beall's and Mr. H. S. Rappleye's assistance with section C.

A. GRAVITATION CONSTANT

The best determinations of the gravitation constant (G)² are considered to be those by C. V. Boys (7) and by K. Braun (8). Each used an improved form of the Cavendish apparatus; and they obtained almost identical results, the final values of the two determinations being the same to the fourth significant figure. They found

$$G = 6.658 \times 10^{-8} \text{ cm}^3 \text{ g}^{-1} \text{ sec}^{-2}$$

which requires that the mean density of earth = 5.527 g/cm³.

B. BASIS OF REFERENCE

The observed values of gravity in Tables 1 and 2 are relative determinations in the Potsdam system, that is, they are based on

¹ Throughout this section the term *acceleration of gravity*, or, briefly, *gravity*, is used, in its commonly accepted sense, to denote the resultant acceleration arising from the gravitational attraction and the rotation of the earth. It is this resultant which is denoted by g .

² The force (f) of gravitational attraction between two masses (m , m_1) separated by the distance r is $f = G \frac{mm_1}{r^2}$.

the value of 981.274 cm/sec² for the pendulum room of the Geodetic Institut in Potsdam, Germany. This value for Potsdam is the result of a large number of careful absolute determinations extending over a series of years. The degree of uncertainty in such absolute determinations is well illustrated by the fact that a similar series of absolute determinations at Vienna, Austria, gave a value 0.016 cm/sec² greater than the one above when referred to Potsdam by relative determinations.

All determinations of gravity should be based on the Potsdam system by means of relative determinations with some station already accurately based on that system. A table of 20 base stations on the Potsdam system is given in *Comptes Rendus l'Association Geodesique Internationale* for 1900, III:25. Most of these stations are included in Table 1.

C. ACCELERATION OF GRAVITY AT SELECTED STATIONS

The stations included in Table 1 are grouped (1) in the order America, Europe, Asia, Africa, Australia, and Oceanic; (2) generally, alphabetically according to countries (United States of America, first); (3) in each subdivision, the stations are arranged alphabetically. Numerals in parentheses, following the name of a subdivision or station refer to the bibliography, and indicate the source from which the data were obtained. If the effect of topography and of isostatic compensation has been computed on the uniform basis of compensation extending to a depth of 113.7 km, the amount of this computed effect is given in the column TC. This effect is the amount by which the actual value of the acceleration would exceed that obtained from Table 2, after correction for elevation by means of equation (1), if there were complete isostatic compensation and if the local distribution of matter were not anomalous.

TABLE 1.—ACCELERATION (g) OF GRAVITY, POTSDAM SYSTEM

(The effect of topography and of isostatic compensation = TC)

Units: Elevation (h), meters; g , cm/sec²; TC, cm/sec²

Station	Latitude	Longitude	h	g	TC	Station	Latitude	Longitude	h	g	TC
AMERICA						Madison, Wis (University of Wisconsin)	43° 4 0'	89° 24 0'	270	980.365	+0.003
United States (%)						Minneapolis, Minn (University of Minnesota)	44 58.7	93 13.9	256	980.597	-0.005
Albany, N. Y. (Public School No. 24)	42° 30 1'	73° 46 1'	61	980.341	-0.006	Mount Hamilton, Calif (Lick Observatory)	37 20 4	121 38 6	1282	979.660	+0.120
Apalachicola, Fla (Weather Bureau)	29 43 5	84 58 8	4	979.322	+0.015	New Orleans, La (City Hall)	29 57 0	90 4 2	2	979.324	+0.013
Asheville, N. C. (Post-office)	35 35 9	82 33 3	670	979.603	+0.026	New York, N. Y. (Columbia University)	40 48 5	73 57 7	38	980.267	+0.011
Atlanta, Ga. (State Capitol)	33 45 0	81 23 3	324	979.524	+0.014	Norris Geyser Basin, Wyo (Yellowstone Park)	44 41 2	110 42 0	2276	979.950	+0.031
Austin, Tex (University)	30 17 2	97 44 2	189	979.283	-0.001	Pembina, N. Dak (Public School)	48 58 1	97 14 9	243	980.917	-0.009
Baltimore, Md (Johns Hopkins University)	39 17 8	76 37 3	30	980.097	+0.006	Philadelphia, Pa (University of Pennsylvania)	39 57 1	75 11 7	16	980.196	+0.009
Blomberg, N. Dak (Will School)	46 48 5	100 47 0	516	980.625	-0.005	Pierre, S. Dak (High School)	41 21 9	100 20 8	464	980.427	-0.013
Boise, Idaho (High School)	43 37 2	116 12 3	821	980.212	-0.042	Pittsburgh, Pa (Second Ward School)	40 27 4	80 0 6	235	980.118	0.000
Calais, Me (High School)	45 11 2	67 16 9	38	980.641	+0.010	Pont Isabel, Tex	26 4 7	97 12 4	8	979.076	+0.015
Cambridge, Mass (Harvard College Observatory)	42 22 8	71 7 8	14	980.398	+0.010	Portland, Ore (Custom House)	45 31 4	122 40 7	8	980.646	-0.016
Charleston, W. Va (High School)	38 20 9	81 37 7	181	979.936	-0.010	Potsdam, N. Y. (Clarkson School of Technology)	41 40 1	74 58 8	130	980.571	-0.004
Charleston, S. C. (S. C. Military Academy)	32 47 2	79 56 0	6	979.546	+0.016	Princeton, N. J. (Princeton University)	40 21 0	74 39 5	64	980.178	+0.013
Charlottesville, Va. (University of Virginia)	38 2 0	78 30 3	166	979.938	+0.002	Richmond, Va (Post-office)	37 32 2	77 26 1	30	979.960	+0.010
Chicago, Ill. (Univ of Chicago)	41 47 4	87 36 1	182	980.278	+0.007	St. Louis, Mo (Washington University)	38 38 0	90 12 2	154	980.001	+0.001
Cincinnati, Ohio (Cincinnati Observatory)	39 8 3	84 25 3	245	980.001	+0.002	Salt Lake City, Utah (Temple Block)	40 46 1	111 53 8	1322	979.803	-0.041
Cleveland, Ohio (Adelbert College)	41 30 4	81 30 6	210	980.211	0.000	San Francisco, Calif. (Davidson Observatory)	37 47 5	122 25 7	114	979.965	+0.045
Colorado Springs, Colo. (Colorado College)	38 50 7	104 49 0	1841	979.490	-0.007	Sandpoint, Idaho (Farmington Central School)	48 16 4	116 33 3	637	980.680	-0.044
Denver, Colo (University of Denver)	39 40 6	104 56 9	1648	979.609	-0.015	Seattle, Wash (Washington State University)	47 39 6	122 18 3	58	980.733	-0.020
Dover, Del (Wilmington Conference Academy)	39 9 7	75 32 0	12	980.039	+0.013	Springfield, Ill. (Edwards Public School)	39 47 7	89 39 5	183	980.080	+0.005
El Paso, Tex (High School)	31 16 3	106 20 0	1146	979.124	+0.001	State College, Pa. (Chemistry Physics Building)	40 47 9	77 51 8	358	980.124	+0.010
Galveston, Tex. (Ball High School)	29 18 2	94 47 5	4	979.272	+0.007	Terre Haute, Ind (Rose Polytechnic Institute)	39 28 7	87 23 8	151	980.072	+0.001
Georgetown, Tex (Southwestern University)	30 38 0	97 40 1	241	979.298	+0.002	Washington, D. C. (U. S. C. and G. S. base station)	38 53 2	77 0 5	14	980.112	+0.004
Goldfield, Nev (High School)	37 42 2	117 14 5	1716	979.456	+0.027	Washington, D. C. (Bureau of Standards)	38 56.3	77 4 0	103	980.095	+0.012
Hartford, Conn (Jarvis Laboratory of Trinity College)	41 44 8	72 11 8	37	980.346	+0.008	Wilmington, N. C. (Court House)	34 14 2	77 56 6	9	979.663	+0.023
Hinadale, Mont (Public School)	48 23 8	107 5 3	601	980.739	-0.017	Worcester, Mass. (Worcester Polytechnic Institute)	42 16 5	71 48 5	170	980.324	+0.018
Hoboken, N. J. (Stevens Institute of Technology)	40 44	74 2	11	980.269	+0.008	Yavapai, Ariz (Yavapai Point)	36 3 9	112 7.1	2179	979.192	+0.034
Indianapolis, Ind (Postoffice)	39 45 9	86 8 8	217	980.090	+0.003	Alaska (*)					
Ithaca, N. Y. (Cornell University)	42 27 1	76 29 0	247	980.300	+0.005	Fort Egbert, Eagle City	64 47.4	141 12.4	269	982.183	-0.042
Kansas City, Mo (Franklin School)	39 5 8	94 35 4	278	979.990	-0.001	Percy Islands, South-east Alaska	54 55.8	131 35.3	4	981.524	-0.013
Key West, Fla. (Post-office)	24 33 6	81 48 4	1	978.970	+0.035						
Lancaster, N. H. (High School)	44 29.5	71 34 3	261	980.486	+0.007						
Las Vegas, N. Mex (Normal School)	35 35.8	105 12 1	1960	979.204	+0.017						
Little Rock, Ark. (Postoffice)	34 45.0	92 16.4	89	979.721	+0.001						

GRAVITY DATA

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Station	Latitude	Longitude	h	σ	TC	Station	Latitude	Longitude	h	σ	TC
Point Young, South-east Alaska	58° 11.5'	134° 33.4'	7	981 757	-0.034	Karlowitz	49° 21.0'	18° 18.7'E	510	980 800	
Quiet Harbor, South-east Alaska	56 14.1	132 39.6	4	981 624	-0.034	Mount Hora	49 10.3	15 42.4 E	710	980 845	
St. Michael	63 28.5	162 2.4	1	982 192	-0.004	Rosenau	48 39.1	20 32 E	281	980 871	
St. Paul Island	57 7.3	170 16.6	10	981 728	+0.041	Denmark (2)					
Canada (2, 26, 21, 22)						Copenhagen (Sternwarte, base station)	55 41.2	12 34.7 E	14	981 559	
Arctic Red River, N. W. Ter.	67 26.6	133 44.2	41	982 434	-0.026	Frederikshavn	57 27.1	10 32.2 E	15	981 740	
Baff, Alta.	51 10.9	115 34.5	1376	980 753	-0.012	Magleby	54 47.3	10 43.0 E	14	981 502	
Calgary, Alta.	51 2.7	114 3.8	1044	980 823	-0.022	Peders Kirke	55 1.6	14 58.8 E	12	981 533	
Charlottetown, P. E. I.	46 13.9	63 7.5	8	980 733	+0.013	Trige	56 15.2	10 9.5 E	91	981 618	
Chinewyan, Alta.	58 42.7	111 8.8	229	981 723	-0.012	Vinding	55 40.3	9 34.5 E	78	981 575	
Good Hope, N. W. Ter.	66 15.3	128 38.2	59	982 340	-0.029	Deutschland, see Germany					
Hahfax, N. S.	44 40.8	63 33.8	9	980 571	+0.008	England, see Great Britain					
Kenora, Ont.	49 46.0	94 30.0	330	980 974	+0.018	Spain, see Spain					
Kingston, Ont. (City Hall)	44 14.6	76 28.8	79	980 530	+0.008	Finland (2)					
Lard River, B. C.	59 58.7	123 17.5	160	981 790	-0.059	Helsingfors (Observatory)	60 9.7	24 57.3 E	29	981 912	
Moose Jaw, Sask.	50 23.4	105 31.8	511	980 943	+0.003	Udelsborg	65 1.2	25 29.1 E	9	982 262	
Norman, N. W. Ter.	64 54.0	125 34.2	87	982 214	-0.036	Viborg (Vapurni)	60 42.9	28 13.7 E	12	981 928	
Ottawa, Ont. (Dominion Observatory, base station)	45 23.6	75 43.0	83	980 618	-0.000	Finne (2)	45 20.0	14 25.8 E	10	980 630	
Peace River, Alta.	56 14.1	117 17.2	324	981 482	-0.038	France (2, 3)					
Port Arthur, Ont. (Masonic Building)	48 26.0	89 13.0	189	980 820	-0.014	Arcachon	44 39.6	1 10.1 E	24	980 586	
Providence, N. W. Ter.	61 21.2	117 39.2	156	981 955	-0.018	Aurillac, Lyceum	44 56.8	2 20.6 E	610	980 483	
Resolution, N. W. Ter.	61 10.1	113 40.5	152	981 942	-0.009	Bayonne	43 29.7	1 28.0 E	3	980 475	
Revelstoke, B. C.	50 59.8	118 11.8	453	980 903	-0.080	Bordeaux (Observatoire)	44 50.1	0 31.4 E	72	980 572	
St. Jérôme (Chateau Larose)	45 46.6	74 0.0	107	980 681	+0.006	Contras	45 2.5	0 7.0 E	13	980 591	
St. John, N. B. (Meteorological Observatory)	45 16.0	66 5.0	33	980 663	+0.016	Jouze	45 26.7	0 26.0 E	35	980 647	
Sault Ste. Marie, Ont. (City Hall)	46 30.4	81 19.2	186	980 680	-0.005	Langon	44 32.7	0 15.3 E	25	980 561	
Simpson, N. W. Ter.	61 51.6	121 20.8	132	982 001	-0.023	Lhons	49 50.0	2 45 E	100	981 038	
Sydney, N. S.	46 8.4	60 11.8	12	980 731	+0.014	Lyon	45 41.0	4 17 E	280	980 629	
Vancouver, B. C.	49 16.8	123 6.8	6	980 940	-0.016	Marseille (Observatoire)	43 17.9	5 23 E	61	980 482	
Winnipeg, Man.	49 54.1	97 8.0	231	980 900	+0.002	Metz	49 7.0	6 10.7 E	175	980 957	
Woodstock, N. B. (Armoury)	46 9.0	67 34.5	56	980 699	+0.008	Mendon (Observatoire)	48 48.3	2 13.9 E	130(?)	980 919	
Woodstock, Ont. (Market)	43 8.6	80 47.0	290	980 352	-0.002	Mont Blanc (Observatoire)	45 50	6 52 E	4807	979 401	
Central and South America (2)						Mont-Louis	42 31.0	2 7 E	1620	979 960	
Bahia Blanca, Argentina	38 47.1 E	62 15.0	2	980 061		Nice (Observatoire)	43 42.8	7 18 E	367	980 471	
Buenos Aires, Argentina	34 36.5 E	58 22.2	2	979 669		Paris (Observatoire, base station)	48 50.2	2 20.3 E	61	980 943	
Bahia, Brazil	12 58.5 E	38 31.0	4	978 331		Port-Vendres	42 50.9	3 6 E	25	980 456	
Panama, Canal Zone	8 54.9	79 31.9	6	978 243		Rosendael-les-Dunk	51 2.0	2 24 E	20	981 170	
Valdivia, Chile	39 53.4 E	73 28.3	10	979 920		Soube	45 31.0	1 7.4 E	8	980 655	
Valparaiso, Chile	33 1.8 E	71 38.5	60	979 600		Strasbourg (base station)	48 35.0	7 46.1 E	137	980 904	
Callao, Peru	12 4.1 E	77 15.8	1	978 375		Valence	44 56	4 53 E	125	980 562	
Acajutla, Salvador	13 34.7	89 50.4	12	978 303		Germany (2, 6)					
Montevideo, Uruguay	34 54.8 E	56 12.9	4	979 772		Alter Bruch	50 45.7	15 44.6 E	917	980 030 +0.000	
Canada see Canada						Bremen	53 5.0	8 49.2 E	0	981 341	
EUROPE						Rocken	51 48.0	10 37 E	1140	981 015 +0.008	
Allemagne, see Germany						Colburg	50 16.0	10 58 E	290	981 015	
Angleterre, see Great Britain						Göttingen (Sternwarte)	51 32.0	9 57 E	102	981 176	
Austria (2, 6)						Grimmen	54 6.9	13 2.7 E	11	981 434	
Brenner	47 0.3	11 30.5 E	1372	980 353		Hamburg (Seewarte)	53 32.8	9 58.3 E	24	981 375	
Dallas	47 8	9 59 E	838	980 454		Hololand	54 10.8	7 53.1 E	51	981 410	
Grafenstein	46 37	14 28 E	417	980 614		Immenstaad	47 40.0	9 22.1 E	403	980 706	
Mixnitz	47 19.8	15 22 E	445	980 657		Jena	50 55.6	11 35.2 E	154	981 123	
Ober-Drauburg	46 45	12 58 E	617	980 555		Karlsruhe	49 0.7	8 24.7 E	114	980 967	
Stilfserjoch (Stelvio Pass)	46 31.8	10 27.4 E	2760	980 045	0.152	Kiel (Sternwarte)	54 20.5	10 0 E	41	981 464	
Vienna (base station)	48 12.7	16 21.5 E	183	980 860		Kirchham	51 38.3	13 33.5 E	98	981 235	
Waidhofen	47 57.7	14 46.7 E	352	980 750		Kolberg	54 11.3	15 35.8 E	8	981 453	
Wien (base station)	48 12.7	16 21.5 E	183	980 860		Königsberg (Sternwarte)	54 42.8	20 29.8 E	22	981 477	
Wolfsthal	48 8.3	17 0.5 E	146	980 904		Leipzig	51 20.1	12 23.5 E	115	981 180	
Belgium (2)						Lützenhausen	52 4.3	9 0.0 E	205	981 242	
Brussels	50 51.0	4 22 E	102	981 112		Munich	48 8.7	11 36.6 E	625	980 733	
Czechoslovakia (2)						Münster	51 57.9	7 37.0 E	62	981 233	
Böhmerwald	49 40.1	12 59.3 E	537	980 921		Neumünster	54 4.4	10 0 E	25	981 427	
Cebon	50 0.9	13 0.4 E	822	980 906		Potsdam (Geodetic Institute, base station)	52 22.9	13 4.1 E	87	981 274	
						Scharfenstein	51 50.0	10 36.0 E	623	981 139 +0.041	
						Schneekoppe	50 44.2	15 44.6 E	1605	980 776 +0.110	
						Schlgrund	52 52.8	15 48.0 E	109	981 278	
						Stuttgart	48 46.9	9 10.5 E	247	980 901	
						Waldsee	47 55	9 45.3 E	590	980 706	

Station	Latitude	Longitude	h	g	TC	Station	Latitude	Longitude	h	g	TC
Great Britain (2)						Norway (2, 4)					
Edinburgh, Scotland (Observatory)	55° 57.4'	3° 9' 4"	104	981 581		Bergen (Sternwarte)	60° 23.9'	5° 18.3' E.	38	981 922	
Glasgow, Scotland (University)	55 51 5	4 14 0	61	981 605		Christiansund	63 6.6	7 44.2 E.	20	982 175	
Greenwich, England (Observatory)	51 28 6	0 0 0	48	981 184		Danabaa	62 4.6	9 8.3 E.	643	981 892	
Kew, England (Observatory)	51 28 1	0 19	5	981 144		Florø	61 35.8	5 2.4 E.	10	982 071	
Plymouth, England	50 22.2	4 8 4	43	981 148		Langenes	60 1 2	15 8.7 E.	8	982 640	
Holland, see Netherlands						Lærdal	61 6.3	7 27.9 E.	7	981 942	
Hungary (2)						Mehavn	71 1.3	27 47 E.	10	982 688	
Budapest	47 20 5	19 3 6 E.	108	980 852		Osla (Christiania) (Sternwarte, base station)	59 54 7	10 43.5 E.	28	981 927	
Kis-Komárom	46 32 9	17 10 7 E.	115	980 745		Osø	58 4 3	8 3.5 E.	10	981 765	
Italy (2, 4)						Rörvik	64 51 9	11 14 3 E.	10	982 313	
Alba	44 42 0	8 2 3 E.	160	980 444		Sand	59 29 1	6 15.7 E.	14	981 853	
Arona	45 45 8	8 34 1 E.	210	980 620		Saunnejoen	66 1 3	12 38.8 E.	12	982 351	
Bologna (University)	44 29 8	11 21 3 E.	51	980 450		Sörvaagen	67 53 6	13 2 E.	10	982 622	+0.0
Brenner (see Austria)						Stavanger	58 58	5 44.3 E.	11	981 845	
Catania, Sicily	37 30.2	15 4 7 E.	43	980 065		Triset	50 25.8	8 10.8 E.	115	981 795	
Castellammare di Stabia	40 41 6	14 28 7 E.	4	980 321		Österreich, see Austria					
Domo d'Ossola	46 7 0	8 18 4 E.	276	980 598		Olana, see Netherlands					
Florence	43 46 8	11 15 2 E.	48	980 510		Paesi Bassi, see Netherlands					
Genoa (Istituto Idrografico)	44 25 1	8 55 3 E.	93	980 573		Pays-Bas, see Netherlands					
Livorno (Laghorn)	43 32 0	10 18 5 E.	6	980 534	-0 018	Poland (2)					
Milan (Observatory)	45 28 0	9 11 5 E.	141	980 569		Bedzin	50 19.3	19 8.7 E.	256	981 058	
Padua (Observatory, base station)	45 24 0	11 52 3 E.	19	980 658		Kraków (Sternwarte)	50 3 9	19 57 6 E.	205	981 054	
Palermo, Sicily	38 6 9	13 22 0 E.	20	980 060		Lwów (Lemberg)	49 50 2	24 0.0 E.	314	980 911	
Pola	44 51 8	13 50 7 E.	28	980 626		Tuchla	48 55.2	23 29 E.	540	980 789	
Pracchia	44 8 0	10 54 3 E.	627	980 378		Portugal (14)					
Romagnano	45 38 1	8 23 8 E.	206	980 620		Campanas	41 53 2	8 40 0	9	980 383	
Rome	41 53 5	12 20 7 E.	49	980 367	-0 012	Lisbon	38 42 5	9 11 3	75	980 088	
San Remo	43 49 1	7 16 5 E.	23	980 505		Oporto	41 8 2	8 36.1	94	980 200	
Stilfseejoch, see Austria						Praia da Rocha	37 7 0	8 32 7	17	980 005	
Stromboli, Lipari Is.	38 48.2	15 14.1 E.	48	980 212		Rumania (2)					
Turin	45 4 1	7 41 8 E.	233	980 540		Borsa	46 56.9	22 42 E.	379	980 711	
Yugoslavia, see Yugoslavia						Bucharest (Bucuresti)	44 24 6	26 6.8 E.	83	980 553	
Netherlands (24)						Elend	47 2 5	22 22 E.	225	980 794	
Amsterdam (University)	52 21 0	4 54 7 E.	0	981 288		Maron-Ludas (Ludas)	46 28 1	24 6 E.	281	980 715	
Bergen op Zoom (Cathédrale)	51 20 7	4 17 3 E.	10	981 212		Russia and Siberia (2, 11)					
Breda (Académie Militaire)	51 35 5	4 46 5 E.	1	981 213		Alexandropol	40 47 0	43 49 7 E.	1519	979 785	
De Bilt (Institut Meteorologique, base station)	52 6 2	5 10 7 E.	2	981 267		Archangel	64 34	40 31 0 E.	5	982 278	
Delft (Institut Géodésique)	52 0 6	4 22 1 E.	2	981 264		Astrakhan	46 21.0	48 2 7 E.	-21	980 774	
Groningen (University)	53 13.2	6 34.0 E.	5	981 348		Byelgorod	50 36.1	36 35 9 E.	203	981 038	
Holland (Sanatorium Hollandoord)	52 24.2	6 25 0 E.	11	981 296		Dagarskoje (L. a. k. e. Baikal), Siberia	55 42 2	109 54 E.	465	981 32	
Leeuwarden (Frische Levensverzekering)	53 12 3	5 48 3 E.	1	981 348		Erivan	40 10 7	44 32 8 E.	090	979 880	
Leiden (Observatoire)	52 0 4	4 20 1 E.	2	981 273		Gorjatchinako, Siberia	52 50.4	108 18 0 E.	470	981 178	
Maastricht (Hôtel de Ville)	50 51.2	5 41 6 E.	10	981 110		Irkutsk, Siberia (Meteorological Observatory)	52 16 5	104 16 5 E.	470	981 096	
Middelburg (États Prov.)	51 30 0	3 36 8 E.	6	981 215		Kazan (Observatory)	55 47.4	49 7 3 E.	70	981 572	
Oldenzaal (Église Pie-chelmi)	52 18 8	6 55 8 E.	47	981 282		Kingisjepp	50 22.5	28 35.7 E.	16	981 858	
School (École primaire)	52 42.1	4 41 6 E.	0	981 312		Leningrad, see St. Petersburg.					
Sittard (Ambachts-school)	50 59.8	5 51 6 E.	48	981 148		Lenkoran	38 45 6	48 51 5 E.	-20	980 092	
Sleen	52 46.5	6 48.1 E.	16	981 318		Lastvinichnoe, Siberia	51 51 0	104 52.5 E.	405	981 051	
Terschelling (École Navale)	53 21 6	5 12 9 E.	6	981 376		Moscow (Observatory)	55 45 3	37 34.3 E.	139	981 562	
Ubagsberg	50 51 0	5 57 2 E.	101	981 108		Novgorod	58 31 4	31 17.3 E.	48	981 780	
Utrecht (Observatoire)	52 5 2	5 7 8 E.	5	981 263		Odessa	46 26 4	30 46 4 E.	43	980 769	
Weert (Église catholique)	51 15.3	5 42 5 E.	33	981 161		Pulkova (base station)	59 46 3	30 10 7 E.	71	981 899	
Winachoten	53 8 7	7 2 4 E.	0	981 346		St. Petersburg (Leningrad)	59 56 5	30 17 7 E.	3	981 929	
						Sehaitanskij	56 54 8	59 57.0 E.	310	981 641	
						Simbirsk	54 19.0	48 24.2 E.	181	981 469	
						Staraya Russa	57 59 4	31 22 E.	23	981 747	
						Tartu (Dorpat, Yuriev), (Observatory)	58 22 8	26 43.2 E.	50	981 793	
						Tiflis (Physical Observatory)	41 43.1	44 47.8 E.	412	980 176	
						Tver	56 51.2	35 50.9 E.	136	981 607	
						Verevy	58 40.8	32 42 0 E.	113	981 794	
						Volkovo	59 4 2	31 46.2 E.	21	981 826	
						Vyshny Volochok	57 35.1	34 33.1 E.	164	981 695	
						Vologda	59 13	39 53.0 E.	118	981 837	
						Schweden, see Sweden					
						Schweiz, see Switzerland					
						Scotland, see Great Britain					

GRAVITY DATA

Station	Latitude	Longitude	h	ρ	TC	Station	Latitude	Longitude	h	ρ	TC
Spain (14)						Ungarn, see Hungary					
Alcázar de San Juan	39° 24.0'	3° 12.0'	648	979 933		Ungaria, see Hungary					
Andájar	38 3.0	4 3 0	207	979 943		Yugoslavia (8)					
Aranda de Duero	41 40.0	3 40.0	801	980 086		Marburg (Maribor)	46° 34'	15° 36' E.	270	980.708	
Arbas	43 0.9	5 45.0	1329	980 132		Ragusa (Dubrovnik)	42 38.6	18 6 E	47	980.394	
Badajoz	38 53.0	6 58.0	188	980 050		Serajevo	43 48.2	18 19.7 E.	311	980.383	
Barcelona	41 25.0	2 7.0 E	407	980 240		ASIA					
Bass	37 30.0	2 45.0	858	979 669		Giappone, see Japan					
Cortagana	37 54.0	6 47.0	765	979 895		China (8)					
Daroca	41 7.0	1 25.0	770	980 038		Hankow	30 35.5	114 17.5 E	73(?)	979.369	
Lérida	41 37.0	0 38.0 E	165	980 260		Hongkong	22 18.2	114 10.5 E.	33	978.771	
Llanés	42 22.0	3 9.0 E	6	980 431		Port Arthur	38 47.9	121 22.3 E.	1	980.128	
Málaga	36 43.0	4 25.2	61	979 918		Shanghai	30 18.1	112 14.8 E.	122(?)	979 303	
Pisa	40 2.0	6 3 0	369	980 073		Wohaiwei	37 30.0	122 11.0 E.	1	979.093	
Pulgará	42 25.0	1 54.7 E	1190	980 055		Zikawei, Observatory	31 11.6	121 25.8 E.	4	979.437	
Roncal	42 49.0	0 59.6	675	980 228		India (8, 9)					
Salamanca	40 58.0	5 39.0	805	980 057		Agra	27 10.3	78 1.1 E.	163	979.038	-0.018
Salou	41 4.0	1 0.0 E	2	980 268		Allahabad	25 25.9	81 55. E.	88	978.945	-0.081
San Fernando	36 28.0	6 12.3	44	979 843		Badnur	21 54.2	77 54.2 E.	641	978.609	+0.018
Santander	43 29.1	3 49.0	10	980 503		Chatra	24 12.7	88 23.4 E.	30	978.890	-0.019
Seville	37 23.0	5 59.0	11	979 965		Colaba	18 53.8	72 48.8 E.	10	978.633	-0.040
Tarifa	36 0.0	5 37.0	29	979 748		Cuttack	20 29.1	85 52.0 E.	28	978.661	0.000
Toledo	39 51.0	4 1.0	520	980 015		Dehra Dun	30 19.5	78 3.2 E.	682	979.085	-0.080
Torrejón	38 0.1	0 39.1	2	980 032		Dohpur	26 42.0	77 54.8 E.	176	979.001	-0.018
Valencia	39 29.0	0 23.0	6	980 127		Gesapur	28 33.0	77 42.0 E.	211	979.137	-0.085
Valladolid	41 39.0	4 43.0	695	980 111		Jacobabad	28 16.6	68 27.1 E.	56	979.188	-0.033
Vivero	43 39.0	7 35.0	12	980 553		Jalpaiguri	26 31.3	88 44.2 E.	82	978.924	-0.093
Suede, see Sweden						Jubbulpore	23 8.9	79 59 E.	447	978.721	-0.003
Suisse, see Switzerland						Kalianpur	24 7.2	77 29.3 E.	637	978.779	+0.011
Svezia, see Sweden						Madras	13 4.1	80 14.9 E.	6	978.281	+0.040
Swizern, see Switzerland						Majhauri	26 17.8	83 58 E.	67	978.930	-0.037
Sweden (2)						Mian Mir	31 31.6	74 22.5 E.	216	979.385	-0.033
Haparanda	65 49.7	24 9.6 E.	4	982 327		Moghal Sarai	25 17.0	83 6 E.	78	978.921	-0.034
Hernösand	62 37.8	17 57.0 E.	25	982 082		Montgomery	30 39.8	73 6.3 E.	170	979.323	-0.019
Lund (Sternwarte)	55 41.9	13 11.3 E.	32	981 564		Musoorie (Camel's Back)	30 27.6	78 4.5 E.	2110	978.798	+0.082
Stockholm (Sternwarte, base station)	59 20.6	18 3.5 E.	45	981 813		Musaffarpur	26 7.1	85 25 E.	55	978.936	-0.038
Uppsala (Sternwarte)	59 51.5	17 37.6 E.	20	981 910		Quetta	30 12.2	67 0.7 E.	1682	978.858	+0.024
Switzerland (8, 13)						Raipur	21 13.9	81 41 E.	304	978.614	+0.001
Basel (base station)	47 33.6	7 34.8 E.	277	980 788		Rajpur	30 21.2	78 5.8 E.	1012	979.004	-0.066
Bern (Landestopographie)	46 56.5	7 26.8 E.	522	980 622		Sandakphu Peak	27 6.1	88 0.2 E.	3588	978.192	+0.141
Bionico	46 7.4	8 55.7 E.	473	980 580		Yercaud	11 46.9	78 12.5 E.	1969	977.910	+0.116
Bruno	46 15.3	10 7.7 E.	721	980 429		Japan (8, 9)					
Burgdorf (Technikums)	47 3.5	7 37.2 E.	558	980 633		Aomori	40 40	140 45 E.	1	980.325	
Chamion (Klubhütte)	45 56.3	7 22.9 E.	2435	980 107	+0.113	Chofu	34 0	131 0 E.	6	979.691	
Eggishorn (Hotel Jungfrau)	46 25.2	8 6.8 E.	2187	980 169	+0.086	Fukushima	37 45	140 27 E.	67	980.022	
Frauenfeld (Kantonschule)	47 33.3	8 54.2 E.	431	980 703		Fukuyama	34 30	133 22.5 E.	3	979.711	
Fribourg (Universität)	46 47.6	7 9.4 E.	633	980 584		Hachinohe	40 31	141 30 E.	21	980.359	+0.049
Gornegrat	45 59.0	7 46.8 E.	3016	979 992	+0.165	Hamada	34 54	132 6 E.	3	979.785	
Grand St. Bernard	45 62.1	7 16.4 E.	2473	980 072	+0.131	Hamamatsu	34 42.9	137 43 E.	31	979.760	
Geneva (Sternwarte)	46 12.0	6 9.2 E.	402	980 592		Himeji	34 50.1	134 42 E.	16(?)	979.764	
Gsteig (Hotel Sanetsch)	46 23.2	7 56.2 E.	1185	980 396	-0.001	Kamakura	35 19.2	139 34 E.	13	979.779	
Landquart (Schulhaus)	46 57.8	9 32.6 E.	520	980 523		Kofu	35 39	138 35 E.	270	979.719	
Lausanne (Ecole de Chimie et de Physique)	46 31.5	6 38.2 E.	531	980 599		Kurume	33 10.3	130 31.6 E.	11	979.618	
Les Verrières	46 54.3	6 28.8 E.	928	980 573		Kyoto	35 1.6	135 47.1 E.	55	979.727	
Lungern (Schulhaus)	46 47.1	8 9.6 E.	714	980 515		Matsue	35 30	133 3 E.	23	979.812	
Luzern (Kantonschule)	47 3.0	8 18.2 E.	434	980 626		Matsuyama	33 50	132 45 E.	19	979.607	
Neuchâtel (Sternwarte)	47 0.1	6 57.3 E.	487	980 653	-0.026	Mizunawa	39 8.1	141 8 E.	61	980.159	
Rivera	46 7.4	8 55.7 E.	473	980 580		Nagasaki	32 44.7	129 52.3 E.	30	979.594	
St. Maurice (Hotel du Simplon)	46 13.0	7 0.2 E.	422	980 512	-0.130	Nagoya	35 10.4	136 53 E.	14	979.756	
Simplonhospis	46 14.9	8 1.9 E.	1998	980 292	+0.076	Nikko	36 44	139 28 E.	649	979.780	
Sion (Collège)	46 14.1	7 21.5 E.	514	980 480	-0.082	Okazaki	34 57.4	137 10 E.	25	979.764	
Stilserjoch, see Austria						Shizuoka	34 58.4	138 23 E.	23	979.753	
Truns (Schulhaus)	46 44.6	8 59.4 E.	859	980.432		Tokyo (base station)	35 42.6	139 46.0 E.	18	979.806	
Zermatt	46 1.5	7 45.0 E.	1603	980 250	-0.007	Tsukuba	36 13.4	140 5.8 E.	870	979.781	
Zerns (Schloss)	46 42.0	10 5.8 E.	1473	980.308		Uwajima	33 13	132 34.5 E.	2	979.697	
Zürich	47 22.7	8 33.1 E.	463	980 676		Wakayama	34 14.2	135 11.0 E.	3	979.704	
Tschecho-Slovakie, see Czechoslovakia						Yamada	34 29.0	136 42.8 E.	4	979.727	
						Yamagata	38 15	140 16 E.	153	980.027	
						Siam (2, 3, 6)					
						Hankok	13 43.9	100 20.4 E.	7	978.278	
						Siberia, (see Russia, p. 398)					
						Turkestan (2, 6)					
						Derbent, Bokhara	38 12.0	67 3.2 E.	1012	979.672	
						Kala Khum, Bokhara	38 27.3	70 46.5 E.	1345	979.462	-0.086
						Samarkand	39 39.1	66 58.7 E.	719	979.883	
						Sultan-Bend	37 7.5	62 28.0 E.	272	979.798	
						Tashkent	41 19.5	69 17.7 E.	478	980.086	
						Chardshui (International Latitude Station)					
							39 6.2	63 36.1 E.	192	980.014	

Station	Latitude	Longitude	h	σ	TC	Station	Latitude	Longitude	h	σ	TC
AFRICA						Perth...	31° 57.1' S.	115° 50.5' E.	58	979.378	
Egypt and Anglo-Egyptian Sudan (1°)						Sydney	33° 51.7' S.	151° 12.7' E.	43	979.680	
Abu Hamed	19° 32.0'	33° 19.9' E.	339	978.538		OCEANIC					
Aswan	24° 5.1'	32° 53.1' E.	97	978.879		Atlantic Ocean and Mediterranean Sea (2, 3, 6, 10)					
Atbara	17° 41.9'	33° 58.9' E.	354	978.421		Bastia, Corsica	42° 41.2'	9° 27' E.	20	980.519	
Helwan	29° 51.5'	31° 20.4' E.	104	979.295		Bridgetown, Barbados	13° 4.3'	59° 36.5' E.	2	978.340	
Khartum	15° 36.6'	32° 32.9' E.	383	978.308		Catania, Sicily	37° 30.2'	15° 4.7' E.	43	980.065	
Luxor	25° 43.1'	32° 39.3' E.	82	978.982		Fornella, Balearic Islands	40° 3.4'	4° 7.9' E.	7	980.283	
Minia	28° 5.8'	30° 45.5' E.	42	979.155		Ibiza, Balearic Islands	38° 54.3'	1° 26.1' E.	3	980.146	
Wadi Halfa	21° 55.8'	31° 19.9' E.	126	978.728		Jamestown, St. Helena	15° 55.8'	5° 43.7' E.	10	978.712	+0.177
Red Sea (2)						Karajak Glacier, Greenland	70° 20.9'	50° 19.8' E.	20	982.534	
Aden	12° 47.3'	44° 59.3' E.	5	978.327		Kingston, Jamaica	17° 57.7'	76° 47.3' E.	2	978.591	
Harmil Island, Dahlak Archipelago Eritrea	16° 28.8'	40° 8.7' E.	4	978.465		Las Palmas, Canary Islands	28° 7.0'	15° 26.0' E.	8	979.385	
Mt. John Island (Zeharget)	23° 35.8'	36° 12.0' E.	6	979.026		Palermo, Sicily	38° 6.9'	13° 22.0' E.	20	980.069	
Mersa Dhiba	25° 20.2'	34° 11.3' E.	2	979.007		Palma de Mallorca, Balearic Islands	39° 34.5'	2° 39.1' E.	23	980.179	
Sherm Sheikh (Sinai)	27° 51.1'	34° 10.9' E.	2	979.174		Ponta Delgada, Azores	37° 43.8'	25° 40.8' E.	4	980.113	
Suez	29° 56.0'	32° 33.4' E.	3	979.307		Reykjavik, Iceland	64° 8.5'	22° 0.3' E.	39	982.273	
Sudan, see Egypt						St. George, Bermuda	32° 21'	64° 40' E.	2	979.806	+0.218
Miscellaneous (2, 3)						Santa Cruz de la Palma, Canary Islands	28° 41.0'	17° 46.0' E.	12	979.459	
Algiers (Observatory)	36° 44.8'	3° 3.3' E.	213	979.905		Strömhol, Lapland Islands	38° 48.2'	15° 14.1' E.	48	980.212	
Bizerte, Tunisia	37° 10.4'	9° 52.5' E.	7	979.075		Whales Point, Spitzbergen	77° 30.4'	20° 58.8' E.	458(?)	982.899	
Biskra, Algeria	34° 50.9'	5° 43.3' E.	137	979.617		Valetta, Malta	35° 53.8'	14° 31.3' E.	62	979.887	
Cape Town, U. S. A. (Observatory)	33° 50.18'	18° 28.7' E.	11	979.657		Indian Ocean, see Pacific Ocean					
Dar-es-Salaam, Tanganyika Tor	6° 49.08'	39° 18.0' E.	7	978.117		Mediterranean Sea, see Atlantic Ocean					
Domjo Ndorobbo	3° 08.88'	35° 14.2' E.	1715	977.549		Pacific and Indian Oceans (2, 3, 6)					
Freetown, Sierra Leone	8° 29.4'	13° 14.3' E.	65	978.200		Auckland, New Zealand	36° 50.98'	174° 46.2' E.	3	979.962	
E. Usso Nyiro, Kenya	1° 53.18'	36° 8.2' E.	676	977.737		Batavia, Java (Observatory)	6° 11.08'	106° 49.8' E.	7	978.178	
Johannesburg, U. S. A. (Observatory)	26° 10.98'	28° 4.5' E.	1805	978.553		Hobart, Tasmania (Observatory)	42° 53.68'	147° 22.0' E.	58	980.441	
Kamp, Cameroons, Fr. Equat. Af.	2° 21.2'	9° 10.6' E.	3	978.010		Honolulu, Territory of Hawaii (Observatory)	21° 18.1'	157° 51.8' E.	6	978.946	+0.162
Laghat, Algeria	33° 47.7'	2° 53.4' E.	755	979.356		Kudat, British North Borneo	6° 53.0'	116° 50.7' E.	2	978.149	
Langenburg, U. S. A. (Observatory)	9° 35.88'	34° 8.6' E.	477	977.907		Makassar, Celebes	5° 7.38'	119° 24.5' E.	2	978.138	
Libreville, Gabon, Fr. Equat. Af.	0° 22.3'	9° 27.2' E.	2	977.999		Manila, Philippines	14° 34.7'	120° 38.6' E.	3	978.360	
Loanda, Angola, Portuguese W. Af.	8° 48.68'	13° 14.1' E.	4	978.212		Marau-Sound, Solomon Islands	9° 49.18'	160° 48.5' E.	3	978.349	
Lourenço Marques, Mozambique, Portuguese E. Af. (Observatory)	26° 2.58'	32° 10.8' E.	55	979.068		Mauna Kea, Hawaiian Islands	19° 49.2'	155° 28.8' E.	3081	978.069	+0.469
Lüderitz Bay, Southwest Af.	26° 38.88'	15° 0.7' E.	2	979.103		Numea, New Caledonia	22° 16.68'	166° 27.8' E.	2	978.877	
Monrovia, Liberia	6° 19.0'	10° 18.8' E.	11	978.165		Singapore, Straits Settlements	1° 16.5'	103° 50.3' E.	21	978.082	
Mozambique, Portuguese E. Af.	15° 2.18'	38° 25' E.	3	978.451		Port Vila, Sandwich Island, New Hebrides	17° 45.08'	168° 19.0' E.	3	978.637	
Ouled Rhamoun, Algeria	36° 10.8'	6° 41' E.	687	979.709		Winter Quarters, Kaiser Wilhelm II Land	66° 2.28'	80° 38.1' E.	1	982.388	
Pangani, Tanganyika Ter.	5° 25.88'	38° 58.8' E.	7	978.039							
Rio del Rey, Nigeria	4° 43.5'	8° 38.3' E.	2	978.087							
Tangier, Morocco	35° 46.5'	5° 48.6' E.	63	979.737							
AUSTRALIA (2, 3, 10)											
Brisbane (Observatory)	27° 28.08'	153° 1.6' E.	40	979.148							
Hobart, Tasmania (Observatory)	42° 53.68'	147° 22.0' E.	58	980.441							
Melbourne (Observatory)	37° 40.98'	144° 58.5' E.	26	979.987							

TABLE 2.—ACCELERATION OF GRAVITY AT SEA-LEVEL (g_0)

$g_0 = 978.039 (1 + 0.005294 \sin^2 \varphi - 0.000007 \sin^2 2\varphi)^*$; Bowie (⁶). φ = latitude. Unit of g_0 is cm/sec². Basis: Potsdam system

φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²
0° 00'	978.039	10° 00'	978.194	20° 00'	978.642	30° 00'	979.328	40° 00'	980.172	50° 00'	981.071	60° 00'	981.917	70° 00'	982.608	80° 00'	983.080				
10	.039	10	.199	10	.652	10	.341	10	.180	10	.080	10	.930	10	.618	10	.065				
20	.039	20	.205	20	.661	20	.354	20	.201	20	.100	20	.943	20	.628	20	.070				
30	.039	30	.210	30	.671	30	.368	30	.210	30	.115	30	.956	30	.637	30	.075				
40	.040	40	.215	40	.681	40	.381	40	.231	40	.130	40	.969	40	.647	40	.080				
50	.040	50	.221	50	.691	50	.394	50	.240	50	.145	50	.982	50	.656	50	.085				
1 00	978.041	11 00	978.227	21 00	978.701	31 00	979.407	41 00	980.261	51 00	981.160	61 00	981.995	71 00	982.665	81 00	983.080				
10	.041	10	.232	10	.711	10	.420	10	.276	10	.174	10	.982	10	.675	10	.094				
20	.042	20	.238	20	.721	20	.434	20	.291	20	.180	20	.990	20	.684	20	.099				
30	.043	30	.244	30	.731	30	.447	30	.306	30	.204	30	.993	30	.693	30	.103				
40	.043	40	.250	40	.742	40	.460	40	.321	40	.218	40	.996	40	.702	40	.107				
50	.044	50	.256	50	.752	50	.474	50	.336	50	.233	50	.998	50	.711	50	.112				
2 00	978.045	12 00	978.262	22 00	978.762	32 00	979.487	42 00	980.350	52 00	981.248	62 00	982.071	72 00	982.720	82 00	983.116				
10	.046	10	.268	10	.773	10	.501	10	.365	10	.262	10	.983	10	.720	10	.120				
20	.048	20	.274	20	.783	20	.515	20	.380	20	.277	20	.990	20	.738	20	.124				
30	.049	30	.280	30	.794	30	.528	30	.395	30	.292	30	.998	30	.746	30	.129				
40	.050	40	.287	40	.804	40	.542	40	.410	40	.306	40	.999	40	.755	40	.132				
50	.052	50	.293	50	.815	50	.555	50	.425	50	.321	50	.999	50	.764	50	.136				
3 00	978.053	13 00	978.300	23 00	978.826	33 00	979.569	43 00	980.440	53 00	981.335	63 00	982.145	73 00	982.772	83 00	983.139				
10	.055	10	.306	10	.837	10	.583	10	.455	10	.350	10	.999	10	.780	10	.143				
20	.056	20	.313	20	.848	20	.597	20	.471	20	.364	20	.999	20	.789	20	.147				
30	.058	30	.320	30	.859	30	.611	30	.486	30	.379	30	.999	30	.797	30	.150				
40	.060	40	.327	40	.870	40	.624	40	.501	40	.393	40	.999	40	.805	40	.153				
50	.062	50	.331	50	.881	50	.638	50	.516	50	.407	50	.999	50	.813	50	.157				
4 00	978.064	14 00	978.341	24 00	978.892	34 00	979.632	44 00	980.531	54 00	981.422	64 00	982.218	74 00	982.821	84 00	983.160				
10	.066	10	.348	10	.903	10	.666	10	.546	10	.440	10	.999	10	.820	10	.163				
20	.068	20	.355	20	.914	20	.680	20	.561	20	.450	20	.999	20	.837	20	.166				
30	.071	30	.362	30	.926	30	.694	30	.576	30	.465	30	.999	30	.845	30	.169				
40	.073	40	.369	40	.937	40	.708	40	.591	40	.479	40	.999	40	.853	40	.172				
50	.076	50	.377	50	.948	50	.722	50	.606	50	.493	50	.999	50	.861	50	.175				
5 00	978.078	15 00	978.381	25 00	978.960	35 00	979.736	45 00	980.621	55 00	981.507	65 00	982.288	75 00	982.868	85 00	983.177				
10	.081	10	.392	10	.971	10	.751	10	.636	10	.521	10	.999	10	.870	10	.180				
20	.083	20	.399	20	.984	20	.765	20	.651	20	.536	20	.999	20	.883	20	.182				
30	.086	30	.407	30	.994	30	.779	30	.666	30	.550	30	.999	30	.891	30	.185				
40	.089	40	.415	40	.999	40	.793	40	.681	40	.564	40	.999	40	.898	40	.187				
50	.092	50	.423	50	.999	50	.807	50	.696	50	.578	50	.999	50	.905	50	.189				
6 00	978.095	16 00	978.430	26 00	979.030	36 00	979.822	46 00	980.711	56 00	981.592	66 00	982.356	76 00	982.912	86 00	983.191				
10	.098	10	.438	10	.999	10	.836	10	.726	10	.606	10	.999	10	.910	10	.193				
20	.102	20	.440	20	.999	20	.850	20	.741	20	.620	20	.999	20	.926	20	.195				
30	.105	30	.455	30	.999	30	.865	30	.757	30	.634	30	.999	30	.933	30	.197				
40	.108	40	.463	40	.999	40	.879	40	.772	40	.648	40	.999	40	.940	40	.199				
50	.112	50	.471	50	.999	50	.894	50	.787	50	.661	50	.999	50	.947	50	.201				
7 00	978.115	17 00	978.479	27 00	979.102	37 00	979.908	47 00	980.802	57 00	981.675	67 00	982.423	77 00	982.953	87 00	983.202				
10	.119	10	.488	10	.999	10	.922	10	.817	10	.689	10	.999	10	.960	10	.204				
20	.123	20	.496	20	.999	20	.937	20	.832	20	.703	20	.999	20	.967	20	.205				
30	.127	30	.505	30	.999	30	.951	30	.847	30	.718	30	.999	30	.973	30	.207				
40	.131	40	.514	40	.999	40	.966	40	.862	40	.730	40	.999	40	.979	40	.208				
50	.135	50	.522	50	.999	50	.981	50	.877	50	.744	50	.999	50	.986	50	.209				
8 00	978.139	18 00	978.531	28 00	979.175	38 00	979.995	48 00	980.892	58 00	981.757	68 00	982.487	78 00	982.992	88 00	983.210				
10	.143	10	.540	10	.999	10	.997	10	.907	10	.771	10	.999	10	.998	10	.211				
20	.147	20	.549	20	.999	20	.999	20	.922	20	.784	20	.999	20	.999	20	.212				
30	.152	30	.558	30	.999	30	.999	30	.937	30	.798	30	.999	30	.999	30	.213				
40	.156	40	.567	40	.999	40	.999	40	.952	40	.811	40	.999	40	.999	40	.214				
50	.160	50	.576	50	.999	50	.999	50	.967	50	.825	50	.999	50	.999	50	.215				
9 00	978.165	19 00	978.585	29 00	979.251	39 00	980.083	49 00	980.981	59 00	981.838	69 00	982.540	79 00	983.027	89 00	983.215				
10	.170	10	.594	10	.999	10	.999	10	.999	10	.851	10	.999	10	.999	10	.216				
20	.174	20	.604	20	.999	20	.999	20	.999	20	.865	20	.999	20	.999	20	.216				
30	.179	30	.613	30	.999	30	.999	30	.999	30	.878	30	.999	30	.999	30	.217				
40	.184	40	.623	40	.999	40	.999	40	.999	40	.891	40	.999	40	.999	40	.217				
50	.189	50	.632	50	.999	50	.999	50	.999	50	.904	50	.999	50	.999	50	.217				
																90 00	983.217				

* This formula differs slightly (not over one in 100 000) from that proposed by Helmert (¹⁴) and quite extensively used. A table similar to this, but based on Helmert's formula is given by Albrecht (¹)

D. VARIATION OF GRAVITY WITH ELEVATION AND DEPTH

Elevation; Free Air Method.—If there were no matter projecting above the geoid and the geoid were a smooth ellipsoid of revolution, then the value (g_H) of the acceleration of gravity (cm/sec²) at a height H meters above the surface would be related (13, 16) to that (g_0) at the surface, as indicated by equation (1), in which ϕ is the latitude.

$$g_H = g_0 - (0.000\,308\,55 + 0.000\,000\,22\cos 2\phi)H + 0.000\,072 \left(\frac{H}{1000}\right)^2 \quad (1)$$

This is known as the free air correction. For most purposes it is sufficient to use the approximate formula (2).

$$g_H = g_0 - 0.000\,3086\,H \quad (2)$$

If g_0 is taken from Table 2, the value of g_H obtained for any station by the use of equation (1) will agree fairly well with the true acceleration, if the surrounding topography is not too rugged. In a fairly flat country, the difference will be considerably less than 0.1 cm/sec², except in very rare cases; and even in a mountainous country, the difference will be less than 0.2 cm/sec². For stations below sea-level, but not below the surface of the earth, the same formulae apply; but for such stations, H is negative.

More Exact Methods.—In mountainous country, the computed value will be practically as close to the true value as in flat country if an additional term is added to the right hand side of equation (1), to take account of the elevation of the place above or below the general level of the topography within a radius of, say, approximately 160 km. For every 10 m the place in question is above the general level, this term amounts to 0.001 cm/sec², and for every 10 m below the general level, it amounts to -0.001 cm/sec². In computing the height of a coast station above the general level, the water must be considered replaced by an equal mass of rock, of average surface density, resting on the bottom of the ocean.

If it is desired to obtain a somewhat better value for the computed gravity at a place, the correction term just mentioned must be replaced by a correction for topography and isostatic compensation, computed by the method of John F. Hayford (12).

A somewhat larger error should be expected in the computed values of gravity on oceanic islands than on the continents. The rocks forming these islands are evidently somewhat heavier than normal in many cases, or the ocean is over-compensated, and the observed values of gravity are therefore usually larger than the computed values. In such cases, an error of 0.3 cm/sec², or possibly even 0.4 cm/sec² in computed values may be expected.

Depth.—As the density of the crust is less than two-thirds the mean density of the earth, the acceleration of gravity increases as we advance into the crust. The mean rate of increase is 0.000 0851 cm/sec² per meter of depth. The actual rate at any place depends upon the density of the crustal material in that locality, and is approximately given by the formula (13, 17)

$$g_d = g_0 + (0.000\,3086 - 0.000\,0837\rho)d \quad (3)$$

where g_d = acceleration of gravity (cm/sec²) at the depth of d m, and ρ = density (g/cm³).

LITERATURE

(For a key to the periodicals see end of volume)

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AERODYNAMICS

L. J. BRIGGS AND H. L. DRYDEN

Problems in aerodynamics cannot be idealized with the same readiness as problems in mechanics. The side of a building may not be regarded as a thin, flat plate for the purpose of computing the force of the wind, and data for a cylinder of a particular length cannot be directly applied for computing the wind force on a cylinder of some other length. Nearby objects exert an influence which cannot be neglected.

Results obtained for a particular object can be applied strictly only to geometrically similar (definition 6) objects in similar surroundings. Many of the apparent discrepancies among the results of different experimenters are to be attributed to departures from geometrical similarity of the models, to the effects of the supports or other nearby objects, and to differences in the fine structure (turbulence) of the approximately steady air streams, rather than to errors in measuring the force or wind speed. It is not possible to discuss these matters in detail here, and there is no complete discussion available for reference.

SYMBOLS

A	Some specified area	CM	Moment coefficient (see paragraph on air foils)
A_r	Aspect ratio	C_N	Coefficient of force normal to the plane of reference
C	A coefficient	CP	Coefficient of power (input)
C_p	Coefficient of center of pressure		
C_d	Coefficient of drag		
C_l	Coefficient of lift		

C_p	Coefficient of power output	$N. A.$	National Advisory Committee for Aeronautics, U. S. A.
C_Q	Coefficient of torque	n	Number of revolutions per second
C_{Q_0}	Coefficient of torque load (output)	P_0	Power developed (output)
C_T	Coefficient of force parallel to the plane of reference	P_i	Power input to propeller
C_t	Coefficient of thrust	$P. R.$	Pitch ratio
$C. P.$	Center of pressure	p	Pressure at a point on a surface
c	Length of chord of airfoil	p_0	Static pressure of the air
D	Diameter	Q	Torque
F	Resultant wind force	Q_0	Torque load (output)
F_d	Drag = Component of F parallel to wind	q	Dynamic pressure, as indicated by Pitot tube (Fig. 1)
F_f	Frictional force	q_0	$\rho V^2/2$ (= q if there is no compression of the air)
F_l	Lift = Component of F normal to wind and to W	R	Reynold's number
F_N	Component of F normal to the plane of reference	S	That dimension of the plane of reference which is at right angles to the wind = Span
F_T	Component of F parallel to the plane of reference	T	Temperature
F_t	Thrust of propeller	t	Thickness
F_x	Any component of F	V	Air speed relative to point considered
L	Some linear dimension	V_i	Indicated air speed
M	Moment of F about forward (leading) edge	W	Width = That dimension of plane of ref-

ence which is normal to S ; i.e., makes least angle with wind	μ	Viscosity
Distance in the plane of reference, from the leading edge, or its projection to C. P.	ρ	Density of air when undisturbed by bodies moving relatively to it.
Efficiency	ρ_0	Conventionally chosen "standard" value of ρ
Angle of attack	ϕ	A definite but unspecified mathematical function

DEFINITIONS

1. Angle of Attack (θ_A) is the angle which the direction of the wind makes with the plane of reference; it is positive if the wind strikes what is the under side of this plane when the body is in its usual position.

2. Aspect ratio (A_r) = S/W .

3. Center of pressure (C. P.) of a body is that point, in the plane of reference, about which the resultant moment of the pressures is zero.

4. Chord (c). See paragraph on airfoils.

5. Coefficient of center of pressure (C_{cp}).

$$C_{cp} = x_c/W; \text{ for airfoil, } C_{cp} = x_c/c.$$

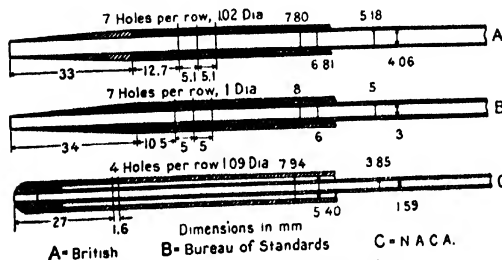


FIG. 1.—Standard Pitot-static tubes.

6. Geometrically similar systems. If two bodies together with their surroundings, are so related geometrically that one system corresponds exactly with a uniformly magnified image of the other, the two systems are said to be geometrically similar.

7. Indicated air speed (V_i) is defined by the relation $q = \rho V_i^2/2 = \rho_0 V_i^2/2$, where ρ_0 is the "standard" air density.

8. Mean temperature (T_m) of atmospheric air column below Z is that temperature for which the pressure at height Z in an isothermal column of air, pressure at bottom = 760 mm of mercury, would be that actually observed in the atmosphere at Z .

9. Pitch ratio ($P. R.$) _{x} at any point of the blade of a propeller or of a wind-mill distant x from the axis of revolution is $(P. R.)_x = 2\pi x/D \tan \theta_x$, where D is the diameter of propeller or mill wheel, θ_x = angle which face of blade makes with plane of revolution. If $(P. R.)_x$ is independent of x , propeller has a constant pitch ratio; if θ_x is independent of x , it has a constant blade angle.

10. Reynold's number (R) = $VL\rho/\mu$, where L is some specified linear dimension. The choice of L depends upon the form of the object, and the problem. R is dimensionless.

CONSTANTS ASSUMED

Standard air density is $\rho_0 = 1.2255 \text{ kg/m}^3 (= 0.002377 \text{ slug/ft.}^3)$, which is essentially that of dry air, with normal CO_2 content, at 15°C and one atmosphere.

$$\mu/\rho = 1.427 \times 10^{-5} \text{ m}^2/\text{sec} (= 1.535 \times 10^{-4} \text{ ft.}^2/\text{sec}).$$

For geometrically similar systems $F_x = qL^2\phi(R) = C'Aq$ (43), where ϕ is independent of the actual size of the system, and q is the value of the dynamic pressure at some specified point. C' is a function only of R and of the geometrical form of the system; its value is the same in every self-consistent system of units, and is independent of the actual size of the system. The data in the following tables and graphs apply when all surrounding bodies

are so far removed from the one considered that they produce no effect upon F_x .

Reduction of Observations.—To obtain true air speed from speed recorded by cup anemometer, use Table 1. Aerodynamic data are usually reduced to a standard air density (ρ_0). For q , this reduction can be effected by replacing the true air speed (V) by the indicated air speed (V_i) (definition 7), and in most cases the same procedure is amply sufficient for C . *Example:* If $V = 100 \text{ ft./sec}$ in air at 30°C and 754 mm of mercury, $V_i/V = 1.030$ (Fig. 2); hence $V_i = 97.1 \text{ ft./sec}$ and $q_0 = 11.20 \text{ lb./ft.}^2$ (Table 2). Owing to isentropic compression of air at this speed, the actual dynamic pressure (q) is $11.20/0.998$ (Table 3) = $11.22 \text{ lb./ft.}^2 = 54.78 \text{ kg/m}^2$.

As a basis for the calibration of altimeters, and for use in the comparison of the performances of aircraft, it is assumed that (1) below a certain altitude (Z_0), the rate of decrease (a) of the temperature (T) with the altitude is a constant; (2) above Z_0 , $a = 0$; (3) at $Z = 0$, pressure = p_0 , temperature = T_0 . The temperature at $Z = T$; the mean temperature below Z is T_m . All temperatures are reckoned from absolute zero. Then, if $Z < Z_0$, $T_m = aZ \log_e(T_0/T)$; if $Z > Z_0$, $T_m = Z/(1/a \log_e T_0 + Z/T_0)$, and for any value of Z , $Z = K \frac{T_m}{T_0} \log_{10} \left(\frac{p_0}{p} \right)$.

The values of these constants define what is called the "standard" atmosphere. There is not entire agreement regarding the values which best represent the average atmospheric condition (28). Those adopted by the governmental aeronautic organizations of the U. S. A. and by many of those of Europe are $T_0 = 288^\circ\text{C}$, $T_1 = 218^\circ\text{C}$, $p_0 = 760 \text{ mm of mercury}$, $a = 6.500 \times 10^{-3}^\circ\text{C/m} (= 1.9812 \times 10^{-3}^\circ\text{C/ft.})$, $Z_0 = 10780 \text{ m} (= 35332 \text{ ft.})$, $K = 19413.3 \text{ m} (= 63691.8 \text{ ft.})$. These differ slightly from those adopted by the International Commission for Aerial Navigation (see p. 72).

TABLE 1. —ROBINSON CUP ANEMOMETER*

True air speed = V ; recorded speed = V_r . If unit is 1 mi./hr., $\log_{10} V = 0.079 + 0.9012 \log_{10} V_r$.

Unit is 1 mi./hr. = 1.467 ft./sec = 0.4470 m/sec

V_r	V	V_r	V	V_r	V	V_r	V
1	1.20	26	22.6	51	41.5	76	50.4
2	2.24	27	23.4	52	42.2	77	50.1
3	3.23	28	24.2	53	42.9	78	50.8
4	4.18	29	24.9	54	43.7	79	51.5
5	5.12	30	25.7	55	44.4	80	52.2
6	6.03	31	26.5	56	45.1	81	52.9
7	6.93	32	27.3	57	45.9	82	53.6
8	7.81	33	28.0	58	46.6	83	54.3
9	8.69	34	28.8	59	47.3	84	55.0
10	9.55	35	29.5	60	48.0	85	55.7
11	10.4	36	30.3	61	48.7	86	56.4
12	11.3	37	31.1	62	49.5	87	57.1
13	12.1	38	31.8	63	50.2	88	57.8
14	12.9	39	32.6	64	50.9	89	58.5
15	13.8	40	33.3	65	51.6	90	59.2
16	14.6	41	34.1	66	52.3	91	59.9
17	15.4	42	34.8	67	53.0	92	60.6
18	16.2	43	35.6	68	53.8	93	61.3
19	17.0	44	36.3	69	54.5	94	62.0
20	17.8	45	37.1	70	55.2	95	62.7
21	18.6	46	37.8	71	55.9	96	63.4
22	19.4	47	38.5	72	56.6	97	64.0
23	20.2	48	39.3	73	57.3	98	64.7
24	21.0	49	40.0	74	58.0	99	65.4
25	21.8	50	40.7	75	58.7	100	66.1

* U. S. Weather Bureau type; diameter of cups = 4 in.; centers of cups are 6.72 in. from axis; V_r = 3 times linear speed of centers of cups (2, 25, 62).

TABLE 2.—DYNAMIC PRESSURE ($q = q_0$) FOR INDICATED AIR SPEED V_i

Air compression is negligible, and $q = q_0 = \rho_0 V_i^2/2$ if $V_i < 30$ m/sec ($= 100$ ft./sec); for greater speeds, q exceeds q_0 , see Table 3.
Metric units are m, kg, sec. English units are ft., lb., sec. 1 lb./ft.² = 4.882 kg/m²; 1 ft./sec = 0.3048 m/sec.

Metric			English			English							
q_0	V_i	q_0	q_0	V_i	q_0	V_i	q_0	V_i	q_0	V_i	q_0	V_i	q_0
0.063	1	0.00119	42.25	26	0.8038	51	3.093	76	6.868	101	12.13	126	18.88
0.250	2	0.00476	45.56	27	0.8608	52	3.215	77	7.050	102	12.37	127	19.18
0.562	3	0.01070	49.00	28	0.9322	53	3.340	78	7.234	103	12.61	128	19.48
1.00	4	0.0190	52.56	29	0.9999	54	3.467	79	7.421	104	12.86	129	19.79
1.56	5	0.0297	56.25	30	1.070	55	3.597	80	7.610	105	13.11	130	20.09
2.25	6	0.0428	60.00	31	1.143	56	3.729	81	7.801	106	13.36	131	20.40
3.06	7	0.0583	64.00	32	1.218	57	3.863	82	7.995	107	13.61	132	20.72
4.00	8	0.0761	68.06	33	1.295	58	4.000	83	8.191	108	13.87	133	21.03
5.06	9	0.0963	72.25	34	1.374	59	4.139	84	8.390	109	14.13	134	21.35
6.25	10	0.1189	76.56	35	1.457	60	4.280	85	8.591	110	14.39	135	21.67
7.56	11	0.1438	81.00	36	1.541	61	4.421	86	8.794	111	14.65	136	21.99
9.00	12	0.1712	85.56	37	1.628	62	4.571	87	9.000	112	14.91	137	22.32
10.56	13	0.2009	90.25	38	1.717	63	4.719	88	9.208	113	15.18	138	22.64
12.25	14	0.2330	95.06	39	1.808	64	4.870	89	9.418	114	15.45	139	22.97
14.06	15	0.2675	100.0	40	1.902	65	5.024	90	9.631	115	15.72	140	23.30
16.00	16	0.3044	105.1	41	1.999	66	5.179	91	9.846	116	16.00	141	23.64
18.06	17	0.3436	110.3	42	2.097	67	5.337	92	10.06	117	16.28	142	23.97
20.25	18	0.3852	115.6	43	2.198	68	5.498	93	10.28	118	16.56	143	24.31
22.56	19	0.4292	121.0	44	2.302	69	5.661	94	10.51	119	16.84	144	24.66
25.00	20	0.4756	126.6	45	2.408	70	5.826	95	10.73	120	17.12	145	25.00
27.56	21	0.5243	132.2	46	2.516	71	5.994	96	10.96	121	17.41	146	25.34
30.25	22	0.5755	138.1	47	2.627	72	6.164	97	11.18	122	17.70	147	25.69
33.06	23	0.6290	144.0	48	2.739	73	6.336	98	11.42	123	17.99	148	26.04
36.00	24	0.6849	150.1	49	2.855	74	6.511	99	11.65	124	18.28	149	26.40
39.06	25	0.7431	156.3	50	2.973	75	6.688	100	11.89	125	18.58	150	26.75

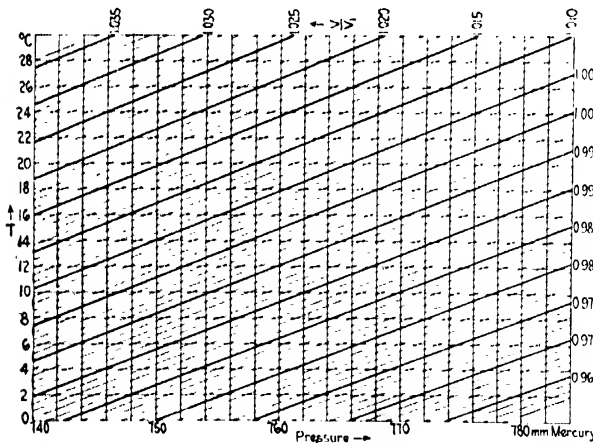
FIG. 2.—Ratio of true air speed (V) to indicated air speed (V_i).

TABLE 3.—CORRECTION FOR ISENTROPIC COMPRESSION (63)

Metric (M) unit of $V = 1$ m/sec; English (E) = 100 ft./sec

Metric (M)			English (E)		
V	M	$\rho^{1/2}/2q$	V	M	$\rho^{1/2}/2q$
		$= q_0/q$			$= q_0/q$
1	30	0.998	6	183	0.931
2	61	0.992	7	213	0.907
3	91	0.982	8	244	0.881
4	122	0.969	9	274	0.852
5	152	0.951	10	305	0.822

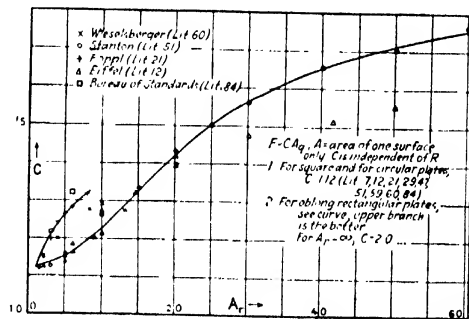


FIG. 3.—Air force: flat plates normal to wind.

TABLE 4.—WIND PRESSURE ON STRUCTURES

Reference plane (see below) is normal to wind. $F_N = C_N A q$; A = area of projection of object upon reference planeUnit of $F_N/A = 1$ lb./ft.² = 4.88 kg/m²

Object	C_N	F_N/A^*
1. Long flat plate	2	30
2. Square flat plate	1.1	16
3. Rectangular prism (1:1:5) (75)	1.6	24
4. Long cylinder	0.8	12
5. Short cylinder	0.7	10

* For $V = 76$ mi. per hr ($= 34$ m. per sec) true speed = 100 mi. per hr recorded by Robinson anemometer.

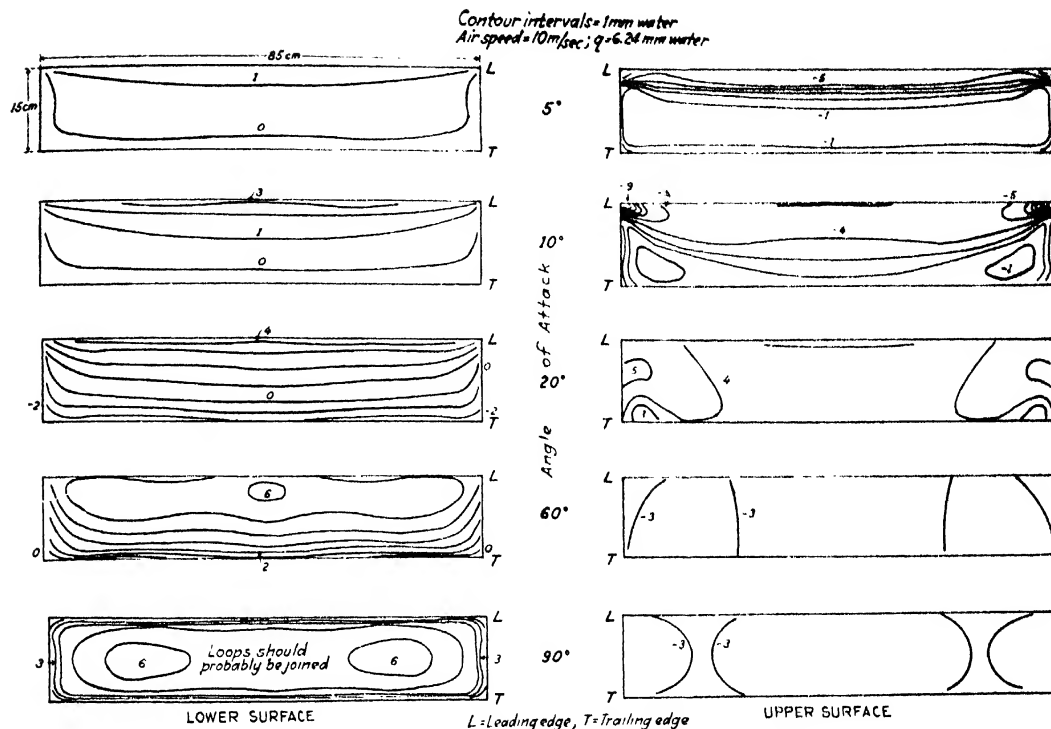


FIG. 4. —Pressure distribution oblong, rectangular plate, inclined (12, 13).

Wind Pressure on Structures.—One must consider (1) maximum wind speed to which the structure will be subjected, (2) the value of the coefficient C_N , and (3) the effective exposed area. The first and the third depend upon local conditions; in the third, shielding effects are very important. The value of C_N should be determined from observations upon a model of the actual structure, as experiments upon flat plates are of little value for this purpose. Opinions differ regarding whether, in gusty winds, the maximum value of F_N is determined by the average or by the maximum value of V (20, 52). Approximate values of C_N for certain typical cases are given in Table 4, where reference plane for flat plate is surface of plate; for prism, its largest face; for cylinder, the plane through axis and normal to that which contains axis and direction of wind. Object (1) is comparable to such structures as wireless masts and long narrow bridge girders; (2) to thin square signboards; (3) to tall buildings; (4) to chimneys; (5) to cylindrical water tanks.

TABLE 5. —SURFACE FRICTION (F_f) ON THIN FLAT PLATES
(Standard density and viscosity)

$F_f (= \int f dA) = 0.0375 A q R^{-0.16} = F_0 A K_w K_r$ (5, 61) where A = total area (both sides) exposed to air stream, F_0 is a factor depending upon the density and viscosity of the air and upon the units employed, and K_w and K_r are numerical factors determined, respectively, by the width (W) of the plate in the direction of the stream, and by the speed (V). F_0 is independent of the ratio S/W , provided $0.5 < (S/W) < 2$; if $S/W = 30$, F_0 is 10% less than the value given in the table. For effect of roughness (it is great), and for variation of f from point to point see (22, 24, 32, 53, 54, 55, 62).

English units $F_0 = 0.0420$ lb./ft. ² Unit of $F_f = 1$ lb.; of $A = 1$ ft. ² ; of $V = 1$ ft./sec				Metric units $F_0 = 0.0311$ kg/m ² Unit of $F_f = 1$ kg; of $A = 1$ m ² ; of $V = 1$ m/sec			
W	K_w	V	K_r	W	K_w	V	K_r
1	1.413	10	0.014	1	1.000	10	1.000
2	1.273	20	0.051	2	0.901	20	3.605
3	1.198	30	0.108	3	0.848	30	7.633
4	1.147	40	0.184	4	0.812	40	13.00
5	1.110	50	0.277	5	0.786	50	19.64
6	1.080	60	0.380	6	0.764	60	27.52
7	1.055	70	0.517	7	0.747	70	36.60
8	1.034	80	0.662	8	0.732	80	46.85
9	1.016	90	0.823	9	0.719	90	58.26
10	1.000	100	1.000	10	0.708	100	70.80
11	0.986	110	1.193	11	0.698	110	84.45
12	0.973	120	1.401	12	0.689	120	99.19
13	0.961	130	1.625	13	0.681	130	115.0
14	0.951	140	1.864	14	0.673	140	131.9
15	0.941	150	2.117	15	0.666	150	149.9
20	0.901	160	2.386	20	0.638	160	168.9
30	0.848	170	2.669	30	0.600	170	188.9
40	0.812	180	2.967	40	0.575	180	210.0
50	0.786	190	3.279	50	0.556	190	232.1
100	0.708	200	3.605	100	0.501	200	255.2

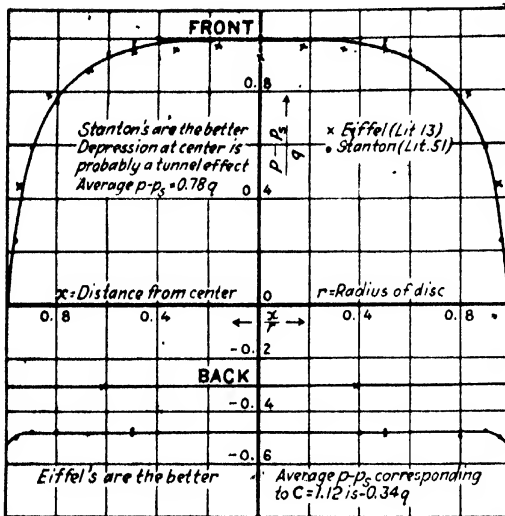


FIG. 5.—Pressure distribution: thin circular disc normal to wind.

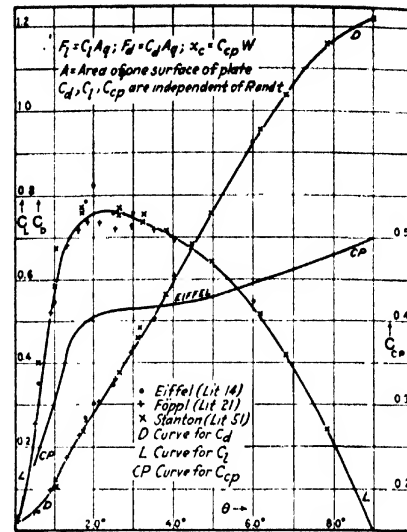
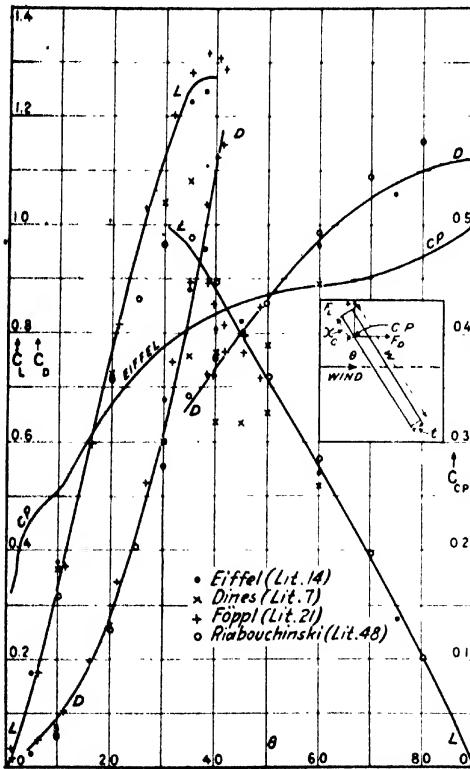
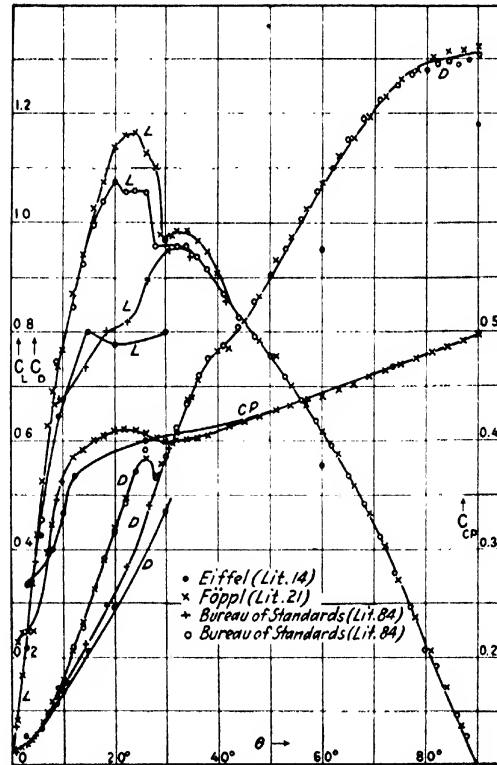
FIG. 7.—Coefficients: inclined, rectangular plates, $A_r = 3$. (See Table 6.)

FIG. 6.—Coefficients: square, inclined plates. (See Table 6; for notation, v. Fig. 7.)

FIG. 8.—Coefficients: inclined rectangular plates, $A_r = 6$. (See Table 6; for notation, v. Fig. 7.)

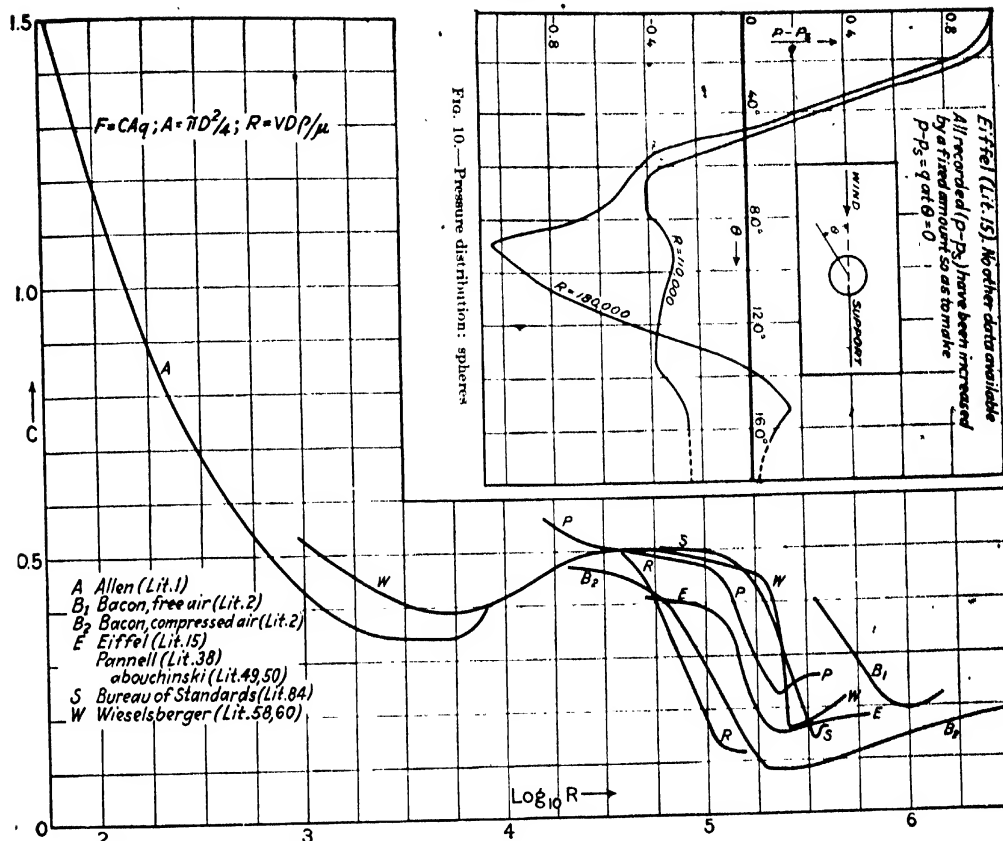


FIG. 9.—Air force: spheres.

TABLE 6.—EXPERIMENTAL DATA; FIGURES 6, 7, 8
Unit of S and $W = 1$ cm; of $t = 1$ mm; of $TD = 1$ m; of $R^\dagger = 1000$

	Fig. 6				Fig. 7				Fig. 8			
	.	X	+	0	.	X	+	0	.	X	+	0
S	25	30.5	12	12	45	7.6	36	90	30.5	72	30.5	
W	25	30.5	12	12	15	2.5	12	15	5.08	12	5.08	
t	3	3.18	1.7		3	0.25	1.7	3	1.17	1.7	1.29	
TD^*	1.5	∞	2.0	1.2	1.5	0.6	2.0	1.5	1.37	2.0	1.37	
R	210	382	55	42	126	10	55	126	64	55	64	

* TD = tunnel diameter.

† R is dimensionless.

The flow about a sphere is extremely sensitive to slight changes in the method of support, and to the condition of turbulence of the air stream. Changes in C are associated with changes in the locus of the points at which the smooth flow leaves the surface, forming a highly turbulent region to the rear. The location of this locus is determined solely by the irregularities in the air stream, as there are no sharp edges or other geometrical feature which might serve to fix it.

Airfoils.—Aerodynamical characteristics are specified in the same manner as are those of plates. An airfoil's area and angle of attack are conventionally defined with reference to some specified plane. The area of the airfoil is defined as that of its normal projection upon this plane of reference. The length (c) of

the projection upon this plane of any fore-and-aft section of the airfoil is called the chord of that section; it is the unit in terms of which all dimensions of that section are expressed. The form of the section is specified by the rectangular coordinates of points upon its boundary; the choice of axes is immaterial, although usually one axis is in the plane of reference. The aspect ratio (A) of the airfoil is defined as the ratio of length of span (S) to length of the chord. In addition to the coefficients considered for plates, the moment coefficient $C_M = M/(qAc)$, and the lift-drag ratio (F_L/F_d) are also of importance.

Data are usually given for $A_r = 6$. If $A_r > 3$, then for a given C_l , $\theta_A = \theta'_A + C_l/\pi A_r$, radians, and $C_d = C'_d + C_l^2/\pi A_r$; θ'_A and C'_d are values of θ_A and C_d when $A_r = \infty$; $C_l/\pi A_r$ and $C_l^2/\pi A_r$ are called the induced angle of attack and the induced coefficient of drag, respectively (25, 26, 42, 72).

For airfoils, C_l increases slightly, and C_d decreases very appreciably, as R is increased; C_p remains unchanged. The difference between the values of the coefficients for airfoils of the size used on aircraft and those for models of the size generally employed in laboratory tests, depends upon the form of the airfoil; for a thin, low cambered section (RAF 15), it is small; for a highly cambered section, it is large.

For the effects produced by placing one airfoil near another, as in a biplane combination see (26, 27, 28, 42, 74).

For a complete airplane, the drag introduced by the body, and the moment of tail lift, both vary appreciably with the size of the airplane (6, 67, 73).

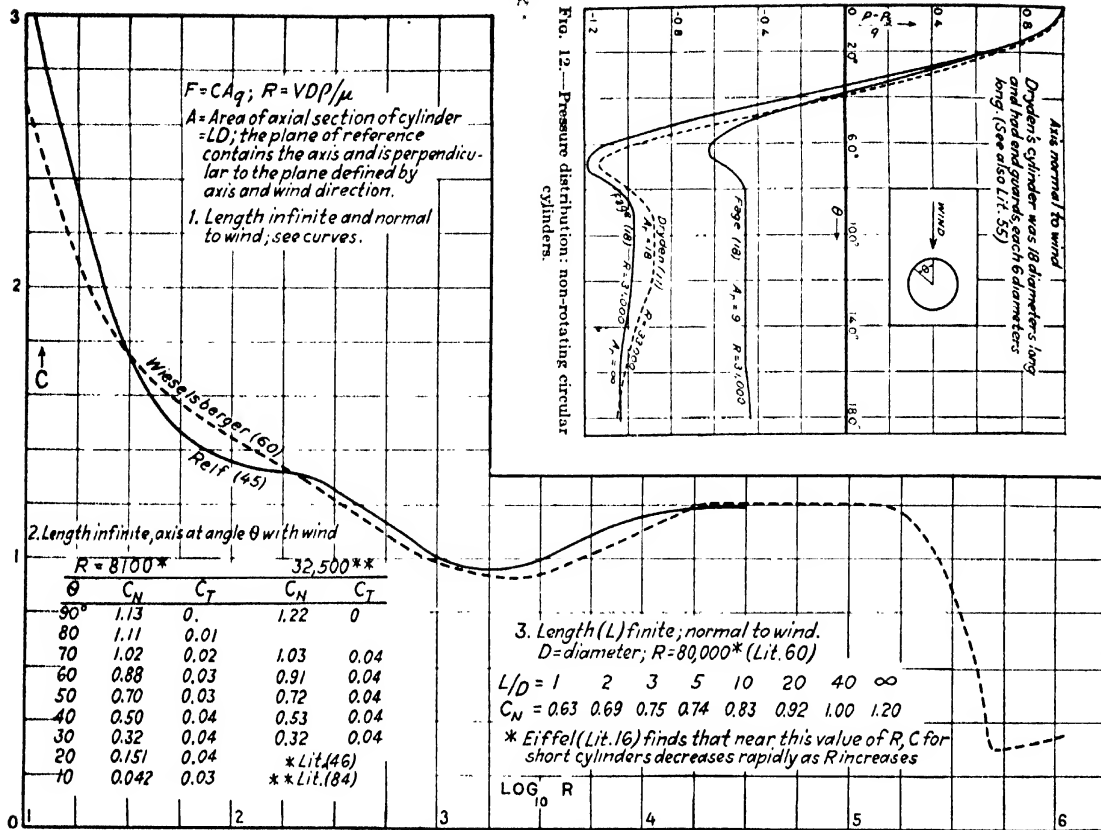


FIG. 11.—Air force: non-rotating circular cylinders.

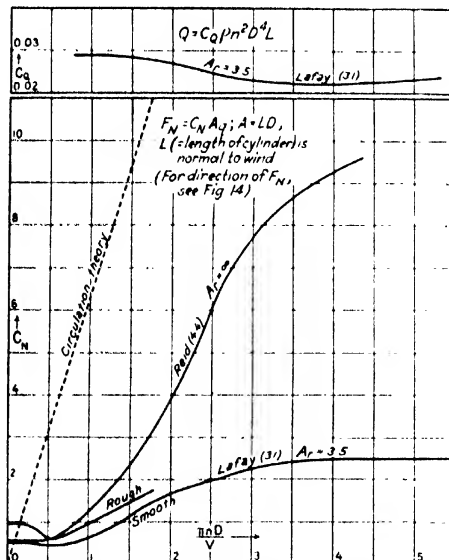


FIG. 13.—Air force: rotating circular cylinders (Magnus effect).

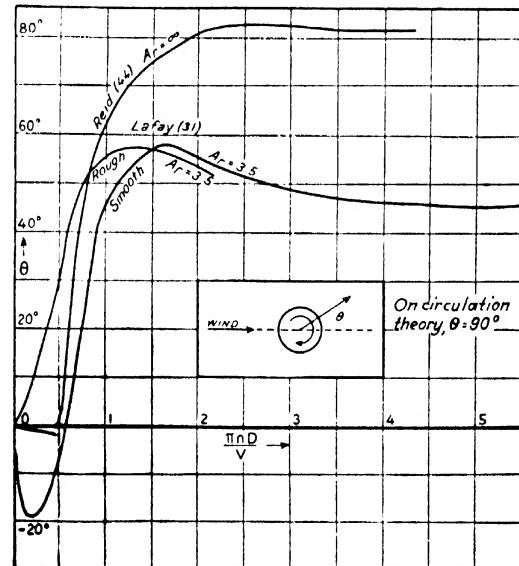
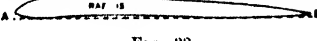



FIG. 14.—Direction of air force: rotating circular cylinders (Magnus effect).

TABLE 7.—CHARACTERISTICS OF AIRFOIL SECTIONS

$A = 6$; model 36 in. by 6 in.; $V = 40$ mi./hr; $R(= \rho Vc/\mu) = 181\,000$; tunnel diameter = 7.5 ft. (87). θ_A is measured from reference plane AB (see Figs. 22, 23, 24); x and y are rectangular coordinates of points on surface of airfoil (y_u, y_l refer to upper and lower surface, respectively); x is measured in plane AB . Unit of x and of y is 1% of chord. For additional data for these and other sections see (12, 13, 14, 24, 27, 68, 69, 70, 72, 80, 81).

Form			Aerodynamical characteristics						
x	y_u	y_l	θ_A	C_l	C_d	F_l/F_d	x_r/c	C_M	
0.00	0.30	+0.30	 FIG. 22.						
1.25	1.90	-0.35							
2.50	2.85	-0.70							
5.00	3.95	-1.05							
7.50	4.65	-1.15							
10.00	5.05	-1.20							
15.00	5.55	-0.85							
20.00	5.78	-0.55							
30.00	5.80	-0.10							
40.00	5.60	-0.03							
50.00	5.23	-0.24	8°	0.76	0.047	16.2	0.297	0.228	
60.00	4.65	-0.50	10°	0.89	0.061	14.7	0.288	0.260	
70.00	4.05	-0.65	12°	1.00	0.083	12.1	0.281	0.286	
80.00	3.30	-0.65	14°	1.02	0.124	8.2	0.298	0.313	
90.00	2.30	-0.30							
95.00	1.68	0.00							
100.00	0.65	+0.34							

0.00	0.00	0.00	 FIG. 23.						
1.25	2.02	-1.65							
2.50	2.71	-2.45							
5.00	3.67	-3.46							
7.50	4.47	-4.10							
10.00	4.95	-4.57							
15.00	5.37	-5.27							
20.00	5.60	-5.58							
30.00	5.60	-5.69							
40.00	5.32	-5.27							
50.00	4.68	-4.52	8°	0.65	0.040	16.2	0.242	0.159	
60.00	3.72	-3.56	10°	0.78	0.054	14.6	0.244	0.193	
70.00	2.61	-2.39	12°	0.88	0.076	11.6	0.246	0.220	
80.00	1.60	-1.44	14°	0.73	0.170	4.3	0.234	0.181	
90.00	0.69	-0.74	16°	0.70	0.239	2.9	0.382	0.293	
95.00	0.37	-0.43							
100.00	0.16	-0.16							

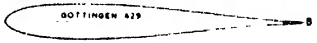
0.00	3.61	3.61	 FIG. 24.						
1.25	6.74	1.35							
2.50	7.98	0.80							
5.00	9.86	0.35							
7.50	11.32	0.18							
10.00	12.40	0.09							
15.00	13.83	0.00							
20.00	14.77	0.07							
30.00	15.36	0.21							
40.00	14.88	0.37							
50.00	13.47	0.54	8°	1.10	0.064	13.0	0.337	0.374	
60.00	11.59	0.54	10°	1.23	0.104	11.8	0.323	0.403	
70.00	9.27	0.54	12°	1.33	0.125	10.6	0.307	0.416	
80.00	6.57	0.49	14°	1.42	0.148	9.6	0.312	0.454	
90.00	3.61	0.27	16°	1.43	0.182	7.9	0.315	0.466	
95.00	1.99	0.16	18°	1.42	0.213	6.7	0.327	0.486	
100.00	0.36	0.00	20°	1.41	—	—	—	—	

TABLE 8.—FORM OF STRUTS; U. S. NAVY 3, BRITISH 4Z

(See Fig. 16.) (These struts give as small a C_d as any)
Unit = axial length of section

$2y$			$2y$			$2y$		
x	U.S.N. 3	4Z	x	U.S.N. 3	4Z	x	U.S.N. 3	4Z
0	0	0	0.250	0.240		0.700	0.184	0.182
0.025	0.092		0.300	0.247	0.250	0.750	0.164	
0.050	0.132	0.122	0.350	0.250		0.800	0.142	0.142
0.075	0.159		0.400	0.250	0.246	0.850	0.116	
0.100	0.180	0.182	0.450	0.250		0.900	0.085	0.094
0.125	0.197		0.500	0.240	0.234	0.950	0.049	
0.150	0.210		0.550	0.230		1.000	0.000	0.000
0.175	0.220		0.600	0.215	0.212			
0.200	0.229	0.240	0.650	0.201				

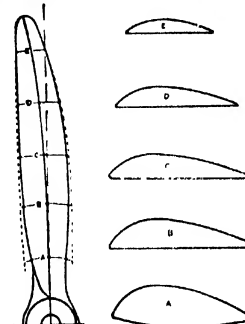


FIG. 18.—Durand's $F_2A_1S_1P_1$ propeller family. Pitch ratio constant. (Members differ only in pitch ratio.)

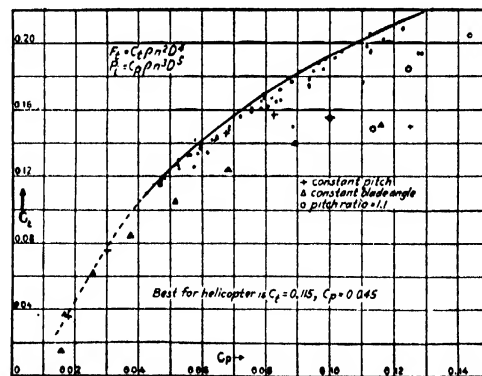


FIG. 19.—Characteristics of Durand propellers at a fixed point (8, 10).

Elongated stream-line solids of revolution have a small resultant drag, which varies greatly with turbulence of air stream, position of neighboring bodies, and slight changes in form. The area entering into the expression $F = CAq$, is generally taken either as the area of maximum section normal to the length, or as (volume) $^{2/3}$. C varies with the Reynold's number. When $A = (\text{volume})^{2/3}$, the minimum value of C for large values of R , and for bodies which are 4 to 5 diameters long, is of the order of 0.014. When $A = \text{sectional area}$, the minimum value of C is of the order 0.03, and is obtained with bodies shorter than 4 diameters. Their equilibrium when parallel to the air stream is unstable; adding fins gives stability and greatly increases their drag (22, 28, 29).

Propellers.—Propellers are usually divided into families in which pitch-ratio and diameter are the only variables. Blade thickness and outline are usually determined largely by structural considerations; if the average thickness and width of blade are fixed, other variations have small effect upon attainable efficiency (8, 9, 18, 19, 68, 69, 71, 76, 77).

The characteristics of a propeller working at a fixed point may be expressed by two dimensionless coefficients, C_t and C_p , defined by the equations $F_t = C_t \rho n^2 D^4$ and $P = C_p \rho n^2 D^4$. For most propellers, there is, between C_t and C_p , a functional relation which is nearly independent of the design, provided large blade angles are not used (32). In Fig. 19, the curve indicates the most favorable results; marked departures from the curve occur mainly with propellers of high pitch ratio, or of constant blade angle.

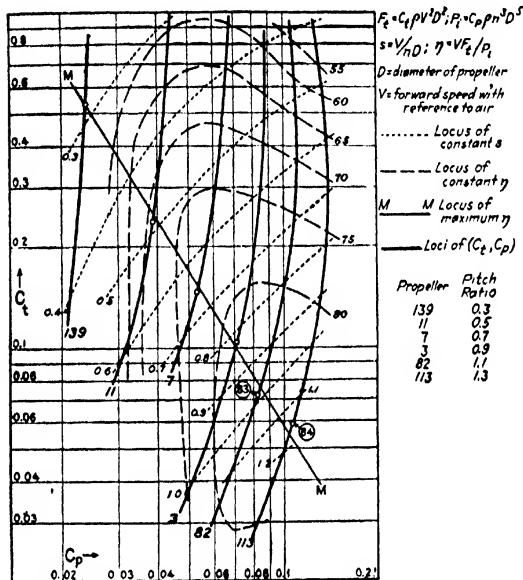


FIG. 20.—Characteristics of advancing Durand F_4A, S_1P_1 propeller family (8).

The characteristics of propellers at various forward speeds (V) and speeds of rotation may be expressed by curves showing the relationships between three parameters. In Fig. 20, the parameters used are C_t , C_p , and s or η , defined by the equation $F_t = C_t \rho V^2 D^2$, $P = C_p \rho n^2 D^4$, $s = V/Dn$; $\eta = C_t s^3 / C_p$, and D = diameter of the propeller. Useful range of C_t is 0.05 to 0.25; of C_p is 0.04 to 0.16. Data given are for propellers of two blades; increasing the number of blades, displaces the curves upwards and to the right.

Wind mills.—Quite different principles control the designing of wind mills which derive power from natural winds, and of those (such as the small wind mills used on airplanes for driving fuel pumps, etc.) which derive their power from the motion of a power driven craft. In the former, the controlling factor is the cost per unit of power developed; in the latter, it is the power consumed per unit of power, or torque load, developed.

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(For a key to the periodicals see end of volume)

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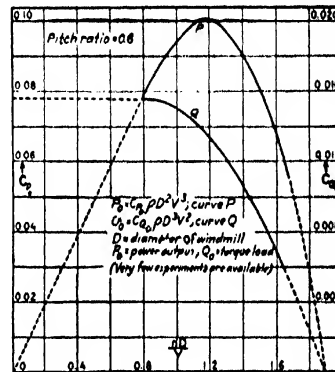


FIG. 21.—Characteristics of two blade windmill (17).

- (40) Powell, 300, No. 416. (41) Ibid., No. 899. (42) Prandtl, 497, No. 116. (43) Rayleigh, 300, No. 39. (44) Reid, 498, No. 209. (45) Reif, 300, No. 102. (46) Helf and Powell, 300, No. 307. (47) Rihouchinaki, 308, 4: 43, 56; 12. (48) Ibid., 4: 113; 12. (49) Ibid., 5: 73; 14. (50) Rihouchinaki, 498, No. 44. (51) Stanton, 135, 186: 78; 03. (52) Ibid., 216: 34; 22. (53) Stanton, 115, 117: 718; 24. (54) Stanton and Marshall, 300, No. 631. (55) Taylor, 300, No. 191. (56) Ibid., No. 604. (57) Warner, E. P., O. (58) Weiselauber, *Z. Flugtechnik Motorluftfahrt*, 5: 140; 14. (59) Ibid., 6: 127; 15. (60) Weiselauber, 63, 22: 219; 22. (61) Weiselauber, 304, 1: 120; 21. (62) Zahm, 5, 6: 58; 04. (63) Zahm and Smith, 497, No. 81. (64) Zahm, et al., 497, No. 187. (65) Zahm, et al., 300, Nos. 61, 62, 63, 64, 65, 126, 128, 289, 264, 265, 308, 316, 320, 321, 371, 328, 329, 390, 392, 401, 409, 408, 431, 437, 439, 442, 443, 444, 458, 460, 475, 466, 565, 575, 577, 596, 591, 594, 599. (66) Zahm, et al., 499, Nos. 699, 708, 629, 630, 599, 570, 571, 581, 582, 584, 585, 587, 592. (67) Ibid., No. 900. (68) Zahm, et al., 497, No. 93. (69) Ibid., No. 124. (70) Zahm, et al., 497, No. 123. (71) Ibid., Nos. 14, 64, 83, 109, 166, 178, 177, 183, 184, 196, 307. (72) Zahm, 304, 1: 37; 21. (73) Ibid., 1: 71; 21. (74) Ibid., 2: 9, 10, 11; 23. (75) Ibid., 2: 33; 23. (76) Zahm, 308, 2: 3; 09. (77) Ibid., 4: 80; 12. (78) Zahm, *Tech. Ber. Flugzeugmeisterer*, 1, No. 4: 119; 17. (79) Ibid., 2, No. 1: 15; 18. (80) Zahm, *Tech. Ber. Flugzeugmeisterer*, 1, No. 5: 148; 17. (81) Ibid., 1, No. 6: 204; 17. (82) Zahm, *Anemometry* (3rd ed.) U. S. Weather Bureau, Inst. Div., Circ. D. (83) Zahm, 308, 97: 285; 97. (84) U. S. Bureau of Standards, O. (85) The National Physical Laboratory, O.

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